AGENDA

Commission for Higher Education

COMMISSION MEETING

Indiana University-Purdue University Fort Wayne
Medical Education Building
Room 123A/B
2101 E. Coliseum Blvd.
Fort Wayne, IN
Phone: 260-481-6103

Friday, September 11, 2009

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The next meeting of the Commission will be on October 9, 2009, in Richmond.

State of Indiana
Commission for Higher Education

Minutes of Meeting

August 13, 2009
Friday

I. CALL TO ORDER

The Commission for Higher Education met in regular session starting at 9:08 a.m. at Vincennes University, Indiana Center for Applied Technology, Room 126, 1500 N. Chestnut St., Vincennes, Indiana, with Vice Chair Ken Sendelweck presiding.

II. ROLL CALL OF MEMBERS AND DETERMINATION OF A QUORUM

Members Present: Cynthia Baker, Gerald Bepko, Dennis Bland, Carol D'Amico, Jud Fisher, Gary Lehman, Marilyn Moran-Townsend, Chris Murphy, George Rehnquist, Ken Sendelweck, Clayton Slaughter

Members Attending via Conference Call: Jon Costas, Mike Smith

The following institutional presidents attended the meeting: Mr. Richard Helton, Vincennes University, Dr. Linda Bennett, University of Southern Indiana, and Mr. Thomas Snyder, Ivy Tech Community College of Indiana.

III. CHAIR'S REPORT

Mr. Sendelweck thanked President Richard Helton and his staff for their hospitality. President Helton gave welcoming remarks. He extended a special welcome for Commissioner Teresa Lubbers in her first meeting as a Commissioner. President Helton briefly spoke of changes and improvements on the Vincennes University campus since the Commission's last visit. President Helton recognized the attendance of Mr. Christian Blome, a former Student Representative on the Commission. Mr. Blome currently serves as Director of Admissions at Vincennes University.

Mr. Sendelweck introduced and welcomed Professor Cynthia Baker, who was recently appointed by the Governor as the Faculty Representative on the Commission. Dr. Baker is a Professor of Law and a Director of Program of Law and State Government at IUPUI.

Mr. Sendelweck announced that Mayor Jon Costas was unable to attend the Commission Meeting because the City of Valparaiso received a special award as the Community of the Year from the Indiana Chamber of Commerce.

Mr. Sendelweck called on Mr. Clayton Slaughter to read a resolution honoring the previous Faculty Representative, Dr. Kathleen Tobin.

R-09-06.1 **WHEREAS** Kathleen Tobin provided faculty representation to the Commission for Higher Education since 2007;

WHEREAS during this time she discharged her duties with extraordinary distinction;

WHEREAS Kathleen Tobin impartially advocated for the students and faculty at Indiana's public institutions of higher education;

WHEREAS she provided opportunities for faculty engagement on Commission for Higher Education initiatives;

WHEREAS she has accepted the responsibility of Chair of the Statewide Transfer and Articulation Committee;

WHEREAS she earned the respect of Commission members, staff, institutional representatives, and her fellow faculty members;

NOW THEREFORE be it resolved that, the Commission for Higher Education expresses its deep appreciation to Kathleen Tobin for her years of dedicated service as the Faculty Representative to the Commission for Higher Education and to the State of Indiana (Motion – Slaughter, Second – Murphy, unanimously approved).

Mr. Sendelweck called on Dr. Gerald Bepko to read the resolution honoring Mr. Richard Johnson.

R-09-06.2 **WHEREAS** Richard Johnson served with extraordinary distinction on the Indiana Commission for Higher Education (ICHE) as an At Large Member since 2005;

WHEREAS during this time he approached the issues before the ICHE with wisdom, circumspection and a balanced recognition, related to his at large appointment, of the many regional, disciplinary, and economic interests that must be blended in shaping the best system of higher education for Indiana;

WHEREAS he provided leadership and vision in a wide variety of important sectors, apart from state government, including business, education, community grounded movements, and the world of philanthropy;

WHEREAS in addition to his ICHE service he was a tireless advocate for education in Indiana including in his role as Chair of the path breaking Columbus Education Coalition, his service on the Indiana University Foundation Board, his memberships on the Deans Advisory Councils for the Kelley School of Business and the Jacobs School of Music, and as a volunteer in the Book Buddies program;

WHEREAS his life and his philanthropy were honored in 2002 by the Creation of the Johnson Center for Entrepreneurship which has helped the Kelley School of Business maintain extremely high standing in this important field of study;

WHEREAS he displayed his generous hospitality to the ICHE by twice hosting its retreat at his Brown County residence, which was instrumental to the discussions, drafting, and completion of the Reaching Higher challenge to Indiana's higher education community;

WHEREAS his dedication to the work of the ICHE was unparalleled;

WHEREAS he earned the deep respect of ICHE members, staff, institutional representatives, members of the executive and legislative branches of Indiana government, and business and community leaders across the state with whom he worked;

NOW THEREFORE be it resolved that, the ICHE at its duly constituted meeting on August 14, 2009, in Vincennes, Indiana, expresses its heartfelt condolences and appreciation to the family of Richard Loomis Johnson for his years of dedicated leadership and service to the State of Indiana and advanced learning for its people (Motion – Bepko, Second – Murphy).

IV. COMMISSIONER'S REPORT

Ms. Lubbers thanked President Helton and VU for hosting the Commission in such a generous and gracious way. Ms. Lubbers said that she officially began as a Commissioner at the beginning of July, and before that she tried to volunteer some time at the Commission, at the same time finishing her job as a Senator. Ms. Lubbers thanked the leadership of the members of the Commission, especially Mayor Costas and Mike Smith, who had shepherded her through the early days, when she was still considered for the position, and later, during the first thirty days as the Commissioner. During this first month Ms. Lubbers had meetings with government, community and institutional leaders, and members of the media. They all are focused on the mission of creating success in higher education in Indiana.

Ms. Lubbers spoke of personnel changes that took place within the past couple of months. First, she mentioned that Mr. Stan Jones, the previous Commissioner, left to lead the newly created organization, National Consortium for College Completion, funded and created by the Bill Gates Foundation. Ms. Lubbers mentioned that Cheryl Orr also left the Commission to work with Mr. Jones. Also, Aja May left the Commission to work at Purdue. These changes, as Ms. Lubbers put it, have created a little bit of angst on her part, but she was pleased to hire Mr. Jason Bearce. He served at the Commission as an intern, then worked at the Commission for some time before going to work at the Department of Education, providing leadership in exactly those areas that are very important for the Commission, particularly in communications, Indiana's Education Roundtable Meetings, and Learn More Indiana.

Ms. Lubbers spoke briefly about the budget. She mentioned that the Commission core appropriation was slightly lower this year, and that Mr. Hannon presented the budget to the members of the Commission later this morning. Ms. Lubbers also talked briefly about setting the non-binding tuition targets for the institutions around the state. The General Assembly has mandated that public colleges and universities set their tuition for two years at a time and hold

public hearings. This is the first year that the non-binding tuition targets are actually being set. She stated that the Commission tried to do this in as thoughtful a way as possible. Mr. Hannon and other members of the staff have been meeting with individual institutions, talking with government leaders, legislative leaders about the process and how to do it. The Commission came out with targets for resident undergraduate tuition that range from zero to 5 percent. Most institutions came in at the higher end or slightly above the target that has been set by the Commission. Subsequent to that, the Commission recommended that the State Budget Committee request that the institutional Presidents, and Chairmen Boards of Trustees meet to explain how they determined tuition levels. Ms. Lubbers said that this is an ongoing process. The Commission is looking for ways to improve the process in the future. Ms. Lubbers noted that this process has not been without pain, but it was a wonderful opportunity for the Commission to assert its value to Hoosiers throughout the state; to look not just at the immediate concern of the tuition during tough economic times, but also look in the bigger way at what the Commission can do, and how the Commission can be more productive in keeping to what has been put forth in the "*Reaching Higher*" document. Ms. Lubbers said that as Commissioner she sees the Commission's role as an important one to work between the universities, the legislature and government leaders to represent the taxpayers in Indiana.

Ms. Lubbers mentioned the Education Roundtable meeting that took place recently. One of the issues addressed at the meeting was dual credit in Indiana. By statute, there was a concurrent enrollment partnership created that operated for the last year. Most institutions in the state were involved in that, looking at the issues of the dual credit and dual enrollment, and whether this should be practiced in Indiana. The recommendation to the Education Roundtable, which was approved, was that the Commission be the facilitator for the dual enrollment in the State of Indiana. The Commission will be reaching out to those who were involved in the partnership.

Ms. Lubbers invited Dr. Hans Giesecke, former President of the Independent College of Indiana, to speak.

Dr. Giesecke spoke briefly about his future plans. He has accepted a position of a president of the Anatolia American College, which was founded in 1886 by American Congregation of Missionaries out of Boston.

Dr. Giesecke offered a few personal recommendations for going forward with the state system of financial aid. The independent sector enrolls 24 percent of the students, but they produce 35 percent of the graduates. One of the chief means for improving the college graduation rate is to continue the policy of having a very strong, need-based, state-funded student financial aid program. Up until the current year Indiana has been a strong national leader with respect to student financial aid. But the budget problem of last year has left the state student financial aid program in a very deep trench for the coming year. The award level for both independent and state universities has been cut 31 percent, and now is at the level it was twelve years ago.

At a meeting a year ago, the Commission started a process for recommending an 18 percent increase in the appropriation for SSACI programs, so that the award levels could be held, even while there was a huge influx of new eligible students into the program. During the special session, ICI continued to push for the 18 percent increase necessary to keep the caps even. Dr. Giesecke said he appeared before the joint Legislative Budget Committee in June, but when the special session ended, the State Student Assistance Commission of Indiana received a 6.5 percent increase. While ICI was enormously grateful for this increase, this amount was inadequate to keep the awards level even for 2009-10.

Dr. Giesecke recommended that, by the end of September, when the enrollments are known, and each campus knows the number of their SSACI grant recipients, there ought to be a formal audit of the grant utilization rate and the predicted amount of grant funds to be unspent at the end of the 2009-10 academic year. If this projected amount of unutilized or underutilized funds exceeds $10,000,000, there should be an immediate effort to restore grant levels, at least partially, even before the second semester begins.

Second, in 2010-11 SSACI grant appropriations for two- and four-year institutions should be split into two separate funds, so that the growing demand of the two-year level doesn't siphon funds from needy students at the four-year institutions.

Third, each fall, as part of appropriation recommendation process, there ought to be a stipulation of the total number of grants to be offered to needy students in four-year institutions for the coming year. Given that the current policy equates to an "entitlement program" for all students, who apply by March 10, Dr. Giesecke opined that the "awards to all comers" approach will continue to dilute the maximum grant approach for students at four-year institutions in future years. Dr. Giesecke said he believes there is still an opportunity to remedy the negative SSACI grant situation for 2009-10 and beyond.

In conclusion, Dr. Giesecke expressed his great pleasure of working with the Commission, and welcomed any answer and comments.

Ms. Lubbers thanked Dr. Giesecke for his work.

Ms. Lubbers informed the Commission that Mr. Hannon's title has changed to Senior Associate Commissioner and Chief Financial Officer, which will reflect his current responsibilities and correspond with the job he had already been doing.

Ms. Lubbers asked for the motion on hiring Mr. Jason Bearce as an Associate Commissioner for Strategic Communications and Initiatives.

R-09-06.3 **RESOLVED**: That the Commission for Higher Education hereby approves hiring Mr. Jason Bearce as an Associate Commissioner for Strategic Communications and Initiatives. (Motion – Murphy, second – Fisher, unanimously approved)

V. CONSIDERATION OF THE MINUTES OF THE JUNE COMMISSION MEETING

R-09-06.4 **RESOLVED:** That the Commission for Higher Education hereby approves the Minutes of the June 2009 regular meeting. (Motion – Bland, second - Lehman, unanimously approved)

VI. DISCUSSION ITEMS

A. Final Report on the 2009-11 Higher Education Budget As Passed by the 2009 Indiana General Assembly

Mr. Bernie Hannon, Senior Associate Commissioner and Chief Financial Officer, gave a brief description of the item. The General Assembly enacted a budget on June 30th, 2009. He briefly went over the legislative process and the timeline. Bernie said that the budget had changed several times in the process of being approved. He reminded the Commission of its

recommendations for the budget, and summarized the 2009-11 budget and appropriations for higher education.

Brief discussion followed. Ms. Marilyn Moran-Townsend asked, following Dr. Giesecke's recommendation of having a formal audit of SSACI in May, whether anything might be done with leftover dollars after the school year. Mr. Hannon responded that if there is any money left after SSACI has distributed awards, those funds are considered available funds, and the awards are available next fiscal year. Ms. Moran-Townsend asked whether this money is being used to raise the SSACI award caps. Mr. Hannon responded that typically SSACI wouldn't change the awards if the school year has already started, but that caps may be raised in fiscal year 2011.

Mr. Chris Murphy asked whether SSACI can ask for more money after the budget has already been set. Mr. Hannon answered that if SSACI is appropriated more money than they spend, the leftover funds go into a reserve account for SSACI. If SSACI promised more funding then they have, then the only way to get more money is a special appropriation from the General Assembly. SSACI projects a 3 percent in reserve at the end of FY 2010.

B. Report on Tuition and Fees Adopted by Indiana's Public Postsecondary Institutions for 2009-11

Mr. Bernie Hannon informed the Commission that Indiana's public postsecondary institutions have adopted tuition and fees for the 2009-10 and 2010-11 academic years. Mr. Hannon reported the tuition and mandatory fees adopted by the institutions and compared those rates to the non-binding recommendations made by the Commission on July 2, 2009.

Mr. Hannon mentioned that public hearings were held to discuss the tuition and fees, but those meetings were sparsely attended by the students. Mr. Hannon suggested that these meetings were not very widely advertised by the institutions; this has to be changed in the future. In the past the Commission had encouraged the institutions to charge higher fees for high demand, higher-cost-to-deliver, high wage programs. Mr. Hannon expressed concern that the exception was swallowing the rule. This policy had worked, but now it is difficult to communicate to the public what it costs to go to college, and why tuition for one program can be higher than for another.

When the public institutions came before the State Budget Committee, they explained reasons for raising tuition and fees. Mr. Hannon noted that lessons learned from this year include the importance of holding more public hearings to provide a better understanding about tuition and fees. The Commission needs to do a better job in connecting the dots between the state appropriations, financial aid and student fees. The Commission and public institutions need to be more transparent in explaining why tuition and fees are increasing.

Brief discussion followed.

C. Report on Twenty-First Century Scholar Success

Ms. Haley Glover, Associate Commissioner for Policy and Planning Studies, presented this item.

In 1990, Indiana legislators created a program to help raise the educational aspirations and attainment of low and moderate income Indiana families. Administered through the State Student Assistance Commission of Indiana, the 21st Century Scholars Program aims to ensure that all Indiana families can afford a college education for their children. A similar report was presented in 2007; a program update will be provided annually from now on.

Ms. Glover provided demographic data about Scholars, and indicated that the program is targeting the low-income students. The proportion of students eligible for a reduced or free lunch has gone up quite dramatically just within last two years. Only about 40 percent of eligible population has signed up for the Scholars program, but the progress is being made.

Mr. Clayton Slaughter asked what the biggest impediment was for getting the scholars to sign for the program. Ms. Glover said there were many reasons that are not known to researchers. However, in the past Scholars needed to sign up. Many parents may have been reluctant to identify as low-income, or to get involved in a state program.

Mr. Jud Fisher asked whether there are other programs that would help with keeping kids on track to go to a college, and then, when in college, help them to stay in college. Ms. Glover said that some colleges provide Scholars with additional support, like Purdue Promise Program and the IU Covenant Program.

Mr. Chris Murphy mentioned that at the Trustees meeting last year there were a lot of presentations about these retention programs at various places. Mr. Murphy asked Ms. Glover whether these funds were SSACI's funds. Ms. Glover confirmed that they were. Mr. Murphy asked then whether the number of people taking advantage of this program will affect the caps. Ms. Glover responded in negative. Because the Scholar program is a supplemental program, students first receive the Frank O'Bannon or Freedom of Choice grant, and the Scholars funding fills in the remaining cost of attendance. In years when grants are not fully funded, however, and the Scholars program must be fully funded to meet the cost of attendance, there may be downward pressure on the caps.

D. Report on Workforce Acceleration Grant Program

Ms. Haley Glover presented this item.

Under the American Recovery and Reinvestment Act, $20-$28M in Workforce Investment Act (WIA) Adult and Dislocated Worker funds have been released to the Indiana Department of Workforce Development. While these funds have been used in other states to support staff additions at workforce centers, Indiana is directing that funding to those, who are most in need. The program will cover the unfunded cost of education after Federal and State financial assistance, and Expected Family Contribution, at a maximum award of $3,000 per year for each program year. Students are eligible for two years of funding.

These targeted students have to be eligible, and there are some steep guidelines: the student has to be 18 years of age or older; unemployed or dislocated worker; low-income (family receives cash payments from public assistance programming, or family income at poverty level).

In order to access the program, the students need to register through their Work One Center, which will track students through a case management system.

VII. DECISION ITEMS

A. Academic Degree Programs

1. Master of Science in Industrial Technology, Master of Science in Computer and Information Technology, and Master of Science in Computer Graphics Technology To Be Offered by Purdue University West Lafayette at West Lafayette

Professor Gary Bertoline, Associate Dean for Graduate Programs in College Technology, Purdue University, talked about this program. They have gone through a very deliberate process at the College Technology to move from the primarily an undergraduate program to the undergraduate and graduate. The College Technology at Purdue has a very large program, the third largest program in West Lafayette, out of the ten colleges. It has about 3600 undergraduate students; over 400 graduate students this fall in the program. In mid-90s they started a College-wide Master of Science degree.

In 2002, Purdue added a Ph.D. program, which is also college-wide. They did it deliberately, to allow the program to mature over the years to the graduate level. Now Purdue is at the point when it needs to have three stand-alone graduate programs. These programs are the most advanced in the graduate studies; all of them have close to 50 students at the ready, who specialize in their respective programs, but they are not at the degree programs. This allows each of those programs to develop further and move forward with the research and teaching, as is allowed with Master of Science programs. These programs were very well received. In the Industrial Technology program students have the opportunity to specialize in areas like bio-informatics, system stimulation, stem education, etc. In Computer Information Technology, there are emerging tech areas and high job demand in those areas, including wireless and global computing, high performance computing, stem education, and bio-medical informatics.

Mr. Slaughter and Ms. Moran-Townsend asked whether the umbrella degree programs will be phased down as these new programs come in. Dr. Bertoline said that this won't happen immediately; there are five other departments to deal with, but this will happen at some point.

Dr. Ken Sauer gave staff recommendations. The three Master's programs that represent three of the specializations currently under the umbrella program, are the most robust in terms of prospective enrollments. The umbrella program as a whole is very robust in terms of its enrollments. As the additional specializations appear as the separate programs, the questions about the viability of the remaining specializations in the overall umbrella program will have to be dealt with, but at this point the Commission is comfortable in going forward with these three new programs.

R-09-06.5 **RESOLVED:** That the Commission for Higher Education hereby approves the Master of Science in Industrial Technology, Master of Science in Computer and Information Technology, and Master of Science in Computer Graphics Technology to be offered by Purdue University at its West Lafayette Campus, in accordance

with the background discussion in this agenda item and the *Abstract*, July 31, 2009; and

That the Commission recommends no new state funds, in accordance with the supporting document, *New Academic Degree Program Proposal Summary,* July 31, 2009 (Motion – Moran-Townsend, second – D'Amico, unanimously approved).

2. Doctor of Philosophy in Epidemiology To Be Offered by Indiana University Through Its IUPUI Campus

Dr. Uday Sukhatme, Executive Vice Chancellor and Dean of the Faculties introduced this item. IUPUI is moving towards building a School of Public Health, and one of the requirements is to have three Ph.D. areas.

To present this item Dr. Sukhatme introduced Professor Marie Swanson, Chair of the Department of Public Health in the School of Medicine. She was a founding Dean of the Zuckerman School of Public Health at the University of Arizona. She is a past President of the American College of Epidemiology, and the former member of the National Public Health Accrediting Council.

Dr. Swanson said that the degree in Epidemiology is in high demand in Indiana and in the whole country. There is currently a 30 percent shortage of doctoral trained epidemiologists in the United States. They predict that with the age and retiring of the current faculty, this number will increase to 50.

Mr. Slaughter asked whether more Ph.D. programs will be required for accreditation. Dr. Swanson answered that one additional PhD will be needed.

Dr. Sauer gave staff recommendations. He said that the University has the strength in this area. The research faculty at the IUPUI campus generated significant research dollars. This degree is closely related to important economic developments areas in Health and Life Sciences, and this will constitute sufficient basis for approving this degree.

Dr. Sauer made two points on public health issue. To have an accredited School of Public Health an institution must have three Ph.D. programs in core areas related to public health. The Epidemiology Ph.D. would represent the second of those Ph.Ds. The first was a Biostatistics program, which the Commission approved in May, 2008.

Second, having an accredited School of Public Health is an important strategic decision for the state. In the 12-state region there are only five states that have Schools of Public Health. If Indiana creates another, this will be the sixth in that region. In the future, the Commission would like to engage Indiana University in the coming

months to explore its plans relating to creating one or even two Schools of Public Health in the state.

R-09-6.6 **RESOLVED:** That the Commission for Higher Education hereby approves the Doctor of Philosophy in Epidemiology to be offered by Indiana University through its IUPUI Campus, in accordance with the background discussion in this agenda item and *Abstract*, July 31, 2009, and

That the Commission recommends no new state funds, in accordance with the supporting document, *New Academic Degree Program Proposal Summary,* July 31, 2009 (Motion – Bepko, second – Slaughter, unanimously approved).

3. Academic Degree Programs on Which Staff Propose Expedited Action

Staff presented a list of degree program proposal(s) for expedited action.

R-09-06.7 **RESOLVED:** That the Commission for Higher Education hereby approves by consent the following degree program(s), in accordance with the background information provided in this agenda item and the *Abstract*, July 31, 2009:

- B.S. in Sales to be offered by Ball State University at Muncie
- M.S. in Applied Statistics to be offered by Indiana University Bloomington in Bloomington

(Motion – Bepko, second – Rehnquist, unanimously approved).

B. Capital Projects

1. Ivy Tech Community College of Indiana Sellersburg, New Construction Project, Workforce Education and Technology Center, Revised Request

Before introducing the project, President Thomas Snyder talked about other items that would be presented at the Commission meeting in Fort Wayne in September. Mr. Snyder said that Ivy Tech will be presenting to the Commission's approval the first online degree in Advanced Manufacturing. It is proprietary, and can be offered nationally.

Mr. Snyder mentioned three announcements that were made this week. Randy Woodson from Purdue University and President Snyder announced their first dual enrollment program in Ivy Tech's history, which is a co-enrollment program in Agriculture, where a student can be enrolled in both schools simultaneously and live in a dormitory on the West Lafayette campus.

Mr. Snyder also announced that Ivy Tech received the largest gift in the school's history. The gift is from the Ball Corporation Headquarters in Muncie from the Fisher family. This is a 100,000 square feet building with a value of $20 million , which will become Ivy Tech Fisher Campus in downtown Muncie. The students are expected to start studying there this fall.

Third, Mr. Snyder spoke briefly about "Achieving the Dream". The Commission has membership on the State Policy Committee for this program. "Achieving the Dream" is a national initiative. The goals of this initiative are: successfully complete remediation, enroll and successfully complete the courses, finish all courses that have been started, persist from one turn to another, and earn at least a certificate or a degree.

Mr. Snyder spoke about the new Sellersburg construction project, the Workforce Education and Technology Center. Sellersburg was originally 57,000 square feet with 20,000 square feet build up. Today campus has 90,000 square feet that Ivy Tech owns, and 50,000 that campus leases. The new facility will include a medical wing, and also a Workforce Training Center.

Mr. Hannon said that Ivy Tech brought this project forward last August. The 2007 General Assembly granted Ivy Tech $20 million in fee-replaced bonding authorization to undertake this project. The Commission reviewed this project on August, 2008. At that time Ivy Tech was hoping that the project could be completed for $16 million. However, since that time Ivy Tech has decided to spend the entire $20 million of authorization on this project.

Ms. Moran-Townsend was wondering whether the number had grown from $16 million to $20 million because of the bid.

Mr. Hannon said there is going to be 77,000 square feet at the campus after the project is completed. The cost of the project increased from $16 million to $20 million, because the bids came in higher than expected.

Mr. Hannon gave staff recommendation.

R-09-06.8 **RESOLVED:** That the Commission for Higher Education hereby recommends approval to the State Budget Agency and the State Budget Committee of the new construction project, Workforce Education and Technology Center at Ivy Tech Community College of Indiana Sellersburg, as described in the project description and staff analysis dated August 14, 2009. (Motion - Murphy, second – Fisher, unanimously approved).

2. Ivy Tech Community College of Indiana Elkhart, New Construction Project, Revised Request

President Snyder briefly spoke about this project. Mr. Snyder said that the fall enrollment at the Elkhart campus far exceeds expectations. The 2007 General Assembly granted Ivy Tech $16 million to develop and purchase a new 70,000 square

foot facility in Elkhart. At that time, Ivy Tech estimated the project could be completed at a cost of $14 million. However, Ivy Tech believed the city of Elkhart would contribute substantial infrastructure improvements toward the project. The city of Elkhart has announced that it does not have the funds to contribute to the additional $4 million toward the project. Ivy Tech is requesting a revised review of this project at the total cost of $20 million.

Ms. Moran-Townsend said that the Commission last year was very excited about the opportunity to complete these projects under budget. She asked if there was anything to be learned, since this did not happen. Mr. Snyder responded that the project requires a lot more engineering effort upfront. The money is designed to offset the lack of infrastructure funding expected from the city of Elkhart.

Mr. Hannon gave staff recommendation. The 2009 General Assembly authorized an additional $4 million toward the project to cover the infrastructure costs and to add additional space onto the project.

Mr. Sendelweck asked what the breakdown was between the infrastructure and the additional space. Mr. Hannon said that it was 50/50.

R-09-06.9 **RESOLVED:** That the Commission for Higher Education hereby recommends approval to the State Budget Agency and the State Budget Committee of the new construction project at Ivy Tech Community College of Indiana Elkhart, as described in the project description and staff analysis dated August 14, 2009 (Motion - Bepko, second - Bland, unanimously approved)

3. Construction of a Parking Garage at Indiana University-Purdue University Indianapolis

Mr. John Grew, Director of State Relations and Economic Initiatives, presented this item. He said that the parking garage was needed to alleviate the parking problem in Indianapolis campus. This particular structure is primarily designed to meet students' demand for parking. The total cost of the project is $18.5 million; it will provide an additional 1,300 parking spaces. Financing will be available through revenue bonds repaid by IUPUI parking operations.

Mr. Slaughter asked whether students will have to pay more for parking because of this project. Mr. Grew responded that there will be no additional charges for parking, since this is a new construction.

Mr. Hannon gave staff recommendations.

R-09-06.10 **RESOLVED:** That the Commission for Higher Education hereby recommends approval to the State Budget Agency and the State Budget Committee of the new construction project, Parking Garage, at Indiana University-Purdue University Indianapolis, as described in the project description and staff analysis dated August

14, 2009 (Motion - Baker, second – D'Amico, unanimously approved).

4. Herrick Laboratory Replacement Phase I on the Purdue University West Lafayette Campus

Mr. Kevin Green, Director of State Relations, presented this item. He said that Herrick Laboratory is one of the oldest research-only facilities on the campus, over a century old. The first phase of the project is to construct a new facility that will be adjacent to the existing Herrick Lab, space that is currently occupied by another obsolete facility. This space will include a Living Lab that will help better understand the relationships between the indoor environment and human health. There will also be a lab to research and develop new fuels and power sources.

Mr. Hannon gave staff recommendations.

R-09-06.11 **RESOLVED:** That the Commission for Higher Education hereby recommends approval to the State Budget Agency and the State Budget Committee of the project, Herrick Laboratory Replacement Phase I, at the Purdue University West Lafayette, as described in the project description and staff analysis dated August 14, 2009 (Motion - Bepko, second - Fisher, unanimously approved).

5. Capital Projects on Which Staff Proposes Expedited Action

Staff presented a list of capital project(s) for expedited action.

- Purdue University, West Lafayette, Boiler No.7 – Infrastructure Preparation and Warehouse Modifications: $3.2 million
- Indiana University, Bloomington, McNutt (Bryan) and Teter (Thompson) Quad Restrooms Renovation: $3.862 million
- Indiana University, Bloomington, Athletics Academic Center Renovation: $3 million
- Ball State University, Construction of Marilyn K. Glick Center for Glass; Project cost: $2 million

R-09-06.12 **RESOLVED:** That the Commission for Higher Education hereby approves by consent the following capital projects, in accordance with the background information provided in this agenda item. (Motion - Murphy, second - Bepko, unanimously approved).

C. Administrative Items on Which Staff Propose Expedited Action

- 2009-10 ICHE Core Operations Budget
- 2009-10 Indiana Education Roundtable Memorandum of Understanding and Budget
- 2009-10 Learn More Indiana Work Plan and Budget

R-09-06.10 **RESOLVED:** That the Commission for Higher Education hereby recommends approval to the FY2009 Improving Teacher Quality Partnership Request for Proposals (RFP) in accordance with the background information dated June 3, 2009. (Motion - Murphy, second - Rehnquist, unanimously approved).

VIII. INFORMATION ITEMS

A. Status of Active Requests for New Academic Degree Programs

B. Capital Improvement Projects on Which Staff Have Acted

C. Capital Improvement Projects Awaiting Action

D. Minutes of the June Commission Working Sessions

There was no discussion of these items.

IX. NEW BUSINESS

Ms. Moran-Townsend gave an update on the Reaching Higher Strategic Implementation Committee. She expressed her gratitude to Chairman Mike Smith for appointing a Committee, comprised of Carol D'Amico, Gary Lehman, Jerry Bepko, Chris Murphy and Clayton Slaughter. With direction and input from both Mike Smith and Commissioner Teresa Lubbers and Committee members, the Committee has identified a work plan that will begin in September. The Committee will start with introspection about how they can improve the value of the Commission. Then the Committee will look into the constituents, how it can approve its working relationships with the universities, the Governor's office and the legislators, among others. Topics the Committee will be focusing on include the college completion agenda, affordability, the role of regional campuses, accountability in the performance incentives and teacher quality.

X. OLD BUSINESS

There was none.

XI. ADJOURNMENT

The meeting was adjourned at 11:30 a.m.

Mike Smith, Chair

Jud Fisher, Secretary

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DISCUSSION ITEM A: **Overview of Ivy Tech Community College Fall 2009 Enrollment**

Staff Recommendation For discussion only.

Background Ivy Tech Community College has experienced unprecedented growth in enrollment at its campuses across the state. Ivy Tech achieved and surpassed its 10-year 2009 enrollment growth goal of 30,000 additional students two years early.

Ivy Tech will present information on Fall 2009 enrollment for all campuses.

Supporting Document To be distributed.

COMMISSION FOR HIGHER EDUCATION
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DISCUSSION ITEM B: **Overview of Indiana Innovation Alliance Plan Presented by Indiana University and Purdue University**

Staff Recommendation

For discussion only.

Background

As a part of their 2009-11 biennial budget requests, Indiana University and Purdue University submitted a joint funding proposal to develop the Indiana Innovation Alliance (IIA). The IIA is intended to "unite the state's largest research universities with business, economic development organizations, healthcare enterprises, and state government to expand Indiana's share of national investment in bioscience research and development" (from budget request). The IIA will focus on three key areas: (1) enhancing core research capabilities; (2) expanding IU's medical education network; and (3) expanding the Purdue University Technical Assistance Program.

The Commission recommended funding for the IIA in the 2009-11 higher education budget recommendations. The General Assembly appropriated funding for the IIA in the following amounts:

Each of FY 2010 and FY 2011:	
Core Research	$5,000,000
Technical Assistance	$2,000,000
Medical Educ. Centers Expansion	$3,000,000

Indiana University and Purdue University have agreed to come present to the Commission their plans for these specific expenditures and for the Indiana Innovation Alliance.

Supporting Document

Indiana Innovation Alliance Cores Proposal, Plan for the Expansion of the Indiana University School of Medicine Education Campuses – September 2009, Purdue University – Technical Assistance and Advanced Education, Appendix 1, Biomedical Device and Biotechnology Core, *attached.*

INDIANA INNOVATION ALLIANCE CORES PROPOSAL

September 2009

I. Introduction

Research core laboratories are service facilities that house cutting edge scientific equipment needed by a wide range of scientific disciplines but which are too expensive to be purchased, maintained, and upgraded by a single academic unit or small business. To function effectively as service facilities, core laboratories must be staffed by excellent technicians and PhD research scientists who can provide technical and consultative expertise to scientists and businesses that wish to utilize the resource.

Indiana University and Purdue University propose to utilize the $10M appropriated for core research to launch two statewide Indiana Innovation Alliance research Cores: 1) The Biomedical Device and Bionanotechnology Core and 2) The Indiana Biomedical Imaging Research and Development Core (I-BIRD). Both universities will fully participate in and contribute resources and expertise to each core. Purdue will serve as the lead institution for operation of the Biomedical Device and Bionanotechnology Core, while Indiana University will serve as the lead institution for I-BIRD.

These two cores are built upon existing areas of strength in the two institutions that also represent opportunities and needs of the private sector. These research cores collectively represent cutting edge technology and expertise that is not readily available in many companies or even in colleges/universities but may be essential for competitive product development. It is important to note that the two cores are complementary. Indeed, new imaging technologies are currently being developed through nanotechnology applications. The appropriated funds will be used to coordinate activities within the respective cores across institutions, enhance existing capabilities, add new capabilities to stay abreast of the latest technology, and enable the two universities to offer these resources to other academic institutions and private companies across Indiana and beyond at a reasonable cost. Considered together, these two cores will enhance our ability to design, prototype, and evaluate novel life sciences diagnostics, therapeutic devices, and instruments and will enable a variety of structural biology, neuroimaging, and advanced clinical research studies.

II. Vision

The ultimate goal of the two Cores is to establish an internationally renowned capability for basic research, translational research and prototyping in the life sciences. Unique will be the collaboration and coordination across multiple institutions and a friendly interface between academia and the private sector.

III. Biomedical Device and Bionanotechnology Core

A. Overview

Faculty across several Purdue and Indiana University Colleges and Schools currently conduct research in the area of biomedical devices and materials and will benefit from the Biomedical Device and Bionanotechnology Core resources. Many of these projects involve industrial collaborators as well as faculty. Schools that will be involved include Veterinary Medicine, Pharmacy, Engineering (including Purdue bio-engineering at both West Lafayette and Indianapolis), Science and Agriculture at Purdue and the School of Medicine, the School of Science at IUPUI, and College of Arts and Sciences at Indiana University. While the two universities already collectively provide enviable world-class research resources, the existing facilities lack key infrastructure and support that is necessary to seamlessly tie together discovery-based research, innovation, device prototyping and translation in the biomedical arena. The proposed Core will fill in gaps and create new capabilities that leverage and synergistically link existing resources across the two universities. Creation of a continuity of activities will benefit economic development in Indiana through mobilization of an unparalleled resource for world class science and engineering, product development and testing, and workforce training.

Industrial partners will directly benefit from these core facilities through improved materials and device characterization capabilities as well as improved prototype development. Among the Indiana industrial partners that will benefit are those that are already engaged with university faculty, including Cook (Bloomington and West Lafayette), Biomet, Depuy and Zimmer (Warsaw), Hill-Rom (Batesville), Aptuit (West Lafayette) and Ft. Wayne Metals (Ft. Wayne). Numerous startup companies in Indianapolis, West Lafayette, Warsaw, and in the Purdue and IU Research parks, including Nanovis [presently a tenant in the Birck Nanotechnology Center's (BNC) Nanotech Incubator], Intelliphage, and BioVitesse will also benefit from the Core capabilities. Additional corporate partnerships will be facilitated through programs such as the Midwest-based Nanobusiness Alliance and the Center for Agricultural and Pharmaceutical Nanotechnology (CAPN), a nascent industry/university cooperative research center between Purdue and the University of Illinois at Urbana-Champaign that has recently been awarded an NSF planning grant. CAPN has already attracted interest from 20 potential member companies, many of which employ Indiana residents.

B. Resources

The Core will house equipment for characterization of biomedical materials and devices in addition to facilities to develop prototypes. Facility upgrades and equipment will complement the analytical, nanotechnology, machining, veterinary and biological testing facilities already existing at Purdue, IUSM, and IUB. In addition, the Core will complement the preclinical development team that is a principal component of the NIH-supported *Indiana Clinical and Translational Sciences Institute (CTSI)*. Thus, full capabilities from basic research through prototype development and testing within a live organism will be a reality through collaborations between the proposed Biomedical Devices and Bionanotechnology Core, the existing expertise in machining and prototype development, and the preclinical development team.

The following is the proposed budget for the Core:

Category	Year 1	Year 2	Project Total
Equipment	$642,000	$1,242,000	$1,884,000
Facility Upgrades	900,000	300,000	1,200,000
Operations and Research Core Support	600,000	600,000	1,200,000
Personnel	358,000	358,000	716,000
Totals	$2,500,000	$2,500,000	$5,000,000

IV. Indiana Biomedical Imaging Research and Development Core (I-BIRD)

A. Overview

Modern life science research depends heavily on "seeing" molecules and macromolecular objects including peering inside humans. Powerful imaging strategies coupled with dramatic improvements in computational tools have developed over the last 10 – 15 years and provided researchers and clinicians with an unprecedented ability to see into biological systems. Imaging needs can be a particular challenge for industry and especially start-up companies as the infrastructure cost is so high as to not allow a single company to implement its needs. Thus, developing a Core in this area that is attentive to industry's needs will not only facilitate Indiana's private sector but also has great potential to attract users from afar thereby bringing new business to Indiana. Purdue and Indiana Universities have invested heavily in these essential technologies and will work in a coordinated fashion

so that these resources can be used efficiently minimizing unnecessary duplication and making them accessible to the Indiana life sciences community, both academic and private.

We will create the **Indiana Biomedical Imaging Research and Development Core (I-BIRD)** that will promote the application of advanced imaging methods in academic and commercial R&D research. The Imaging Core will allow industrial partners access not only to the technology but to the all-important technical expertise as well. Several examples already exist for collaboration between Indiana companies and imaging capabilities at both Purdue and IU including DowAgrosciences, Amgen and Millipore and early-stage Indiana companies such as AEON Imaging, Kylin Therapeutics, Prosolia, Aquascience, IkoTech, BioVitesse, InPhoton, Fast Diagnostics and PDS Biotechnology.

In order to maintain a national/international leadership position, both people and laboratory resources need to be continually enhanced. Key resource needs include:

1. Salary funding for faculty time to assist academic and industry scientists with new project study design, implementation, and data analysis.
2. Salary funding for a non-faculty scientific support team with dedicated time to support core service functions and industry contract service and clinical trial needs, including but not limited to, imaging project management, implementation of core services, quality control and maintenance of core instruments, image processing and data analysis, and final report generation.
3. Funding to establish the IT, image processing, and data analysis infrastructure needed to facilitate remote participation and analysis of data collected within this program.
4. Funding to enhance imaging probe development capabilities. This potentially would include new automated chemistry synthesis modules for the generation of radioactive and non-radioactive imaging probes and highly trained support staff to provide imaging probes suitable for human administration on a daily basis.
5. Upgrading of high tech imaging systems on a regular life cycle basis as well as implementing new, innovative imaging modalities.

In addition, by developing specific training programs, I-BIRD offers the opportunity to enable a new generation of Indiana workers to be able to take advantage of future job opportunities in Imaging Science.

B. Resources

Current extensive capabilities in biological imaging already exist at IU and Purdue. Although there is currently cooperation across campuses and institutions, collaboration is ad hoc and a function of individual investigators and small groups finding one another and deciding how to work together. I-BIRD will bring a formal approach to efficient utilization of resources and will facilitate academic and industrial partnerships developing through the recently funded *Indiana CTSI*. In so doing, it will minimize duplication of technology, determine in a collaborative fashion where technology investments should be made, determine where people infrastructure should be enhanced, and offer a service mentality to public and private users alike. The proposed budget allocations for the Core are highlighted below.

Category	Year 1	Year 2	Project Total
Equipment	$1,300,000	$1,300,000	$2,600,000
Facility Upgrades	300,000	300,000	600,000
Operations and Research Core Support	500,000	500,000	1,000,000
Personnel	400,000	400,000	800,000
Totals	$2,500,000	$2,500,000	$5,000,000

V. Metrics

Key metrics will include:

- Number of users overall and new users from both academia and industry
- IP generation
- New company formation
- Prototypes developed and translated to industry
- Number of learners participating in Core activities
- Trainees who enter the work force in Indiana
- New revenues to the State such as grants supporting academic research, small business innovation awards, or fees for services rendered

VI. Management Plan

Success of the Alliance and its Cores depends on effective management oversight and sound decision-making to ensure optimal use of funding and other IIA resources. Thus, the IIA initiative proposes that the Alliance establish a management committee composed of two representatives each from Purdue and IU, two representatives of industry (e.g., trade organization and life sciences company), and a representative of state government. This seven member Alliance management committee would oversee the annual budget for Core support and regularly monitor Core operating and equipment procurement expenditures. In addition, the lead institution for each Core will identify a Managing Director to coordinate the day to day operations of the Core and a scientific committee to review and recommend areas for funding. The support institution for each Core will identify a staff liaison to work closely with the Managing Director to ensure that the two universities are coordinated in their efforts. The entire program will be managed in conjunction with the Indiana Clinical and Translational Sciences Institute, an organization that is already established as a partnership among IIA components. This organizational approach will not only result in effective management of this IIA program but will also enhance the ability to renew the CTSI award in a few years as it will serve as a powerful example of both institutional collaboration and of State support for the CTSI.

Plan for the Expansion of the Indiana University School of Medicine Education Campuses – September, 2009

Overview

The Indiana University School of Medicine (IUSM), the sole medical education institution serving Indiana, proposes a plan to expand its medical student enrollment by 30 percent, from 280 per class to 364. The expansion plan started with students matriculating in August 2007 and will continue for eight years to completion in 2015. At that time, the IU School of Medicine M.D. student enrollment would reach its maximum of 1,456 medical students.

Why Expand the Class Size?

A physician workforce study, conducted and released in 2006 by the Indiana University School of Medicine in collaboration with the State of Indiana, found a shortage of physicians in many parts of Indiana, and predicted an even greater disparity between available physicians and patients served, by 2020. According to studies conducted by the Association of American Medical Colleges, the American Medical Association, and the Committee for Graduate Medical Education, the reasons for the shortage of physicians across the country, including Indiana, are multiple. They include a predicted increase in demand for medical care by the population, in large part driven by the substantial increase in the elderly; earlier retirement of the current physician work force; a decrease in hours worked by practicing physicians (especially women physicians); and an increasing number of people approaching or older than age 65 (the "baby boomers"). The forecasts predict a scarcity of physicians, particularly in primary care, in non-urban communities and in historically underserved communities.

The IUSM Expansion Plan

The IU School of Medicine has provided its medical educational program statewide since implementation in the 1960s. Currently there are nine campuses throughout Indiana delivering this medical education program (see figure 1).

Currently, medical students complete their first two years assigned in a distributed manner among the nine Centers of Medical Education. For the third and fourth years of medical school, students are currently assigned to the Indianapolis campus for their clinical experiences in the eleven required clinical clerkships. Similarly, clinical electives are completed in-and-around the Indianapolis campus, although there is no geographic requirement to do so. Indiana ranks second in the United States in retaining its medical school graduates to practice in Indiana (Arkansas ranks ahead). Reasons for this retention are multiple, including: greater

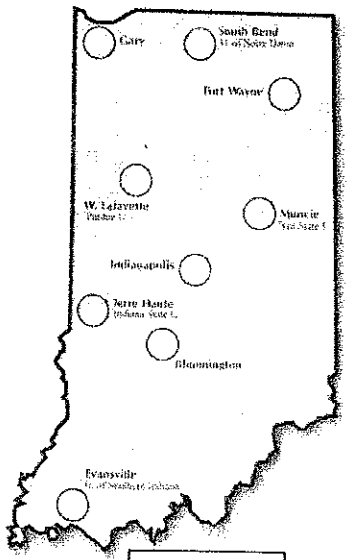

Figure 1

than 40% retention rate of medical school graduates into post graduate residency training programs throughout Indiana; a favorable clinical malpractice climate; family in Indiana; and personal and professional relationships made during medical school. Data now confirm a positive retention rate of medical graduates returning to the areas of our Regional Medical Campuses, if the graduate completed the first two years of medical school at that center, as well as increased likelihood of entering primary care practice.

It is our belief that the 2007-2015 medical school expansion plan will be fundamentally important to solving the physician shortage problems in the state of Indiana. It should be implemented fully, so that by the year 2020, when the physician demand model predicts the shortage to occur, Indiana will already be producing enough physicians, from its medical school and residency training programs, to care for its people. It is also important to acknowledge that the physician workforce needs of Indiana go beyond simple headcounts. The School of Medicine also recognizes that it must aggressively address the need for more primary care physicians, in addition to those who enter practice in smaller or rural communities. Our centers of medical education provide an ideal system to simultaneously address all the dimensions of physician staffing needs.

Because of Indiana's unique distributed medical educational system, we are prepared to prevent the physician shortage in Indiana by an expansion that is economical, educational, logical, and ultimately beneficial for the citizens of the State of Indiana. The following stepwise plan will necessitate a willing partner in our State Government, since new base funding support for the Centers of Medical Education will be required to both implement and maintain the program.

1. Expansion plans for the Centers in years one and two

The first step in the IUSM expansion calls for all expanded matriculants to be assigned to the current regional medical campuses in Terre Haute, South Bend, Evansville, Lafayette, Muncie, Bloomington, Gary, and Fort Wayne. Each center will absorb at least 8 new students; some will increase by more (see the attachment).

Because most of the IUSM campuses have recently constructed new facilities, there will be ample room for the expanded number of medical students (the Lafayette facility is the exception). Each campus will require some minor renovations and new equipment such as anatomy dissecting tables, IT equipment, etc. Since these are marginal one-time costs, expansion in the first two years will require minimal fiscal, educational, or programmatic changes beyond what we are doing now. Although current faculty numbers are adequate to provide the necessary instruction in the competency-based curriculum, increased staff support at the regional campuses will be necessary to provide academic, career, and personal counseling. In addition, educational administrative support for the Dean's Offices of Medical Student Affairs and Medical Education and Curricular Affairs will be necessary (1 FTE per Office).

2. New Clerkships and Hospital Partners at the Regional Medical Centers

The expansion will require IUSM to provide an increased number of third- and fourth-year clinical experiences outside of Indianapolis. Clinical rotations will occur in the major hospitals and clinics in the cities of our regional Centers of Medical Education. It is expected that many medical students who complete their first two years at one of the regional campuses will still move to Indianapolis as their "home base" for years three and four. Some regional medical students may chose to remain for clinical clerkships at that regional campus because of family, financial, and other individual reasons and would be permitted to do so. These students may complete many of their required clinical clerkships, up to eleven, at the regional hospitals. Students at Indianapolis would complete three or four of their required clerkships outside the metropolitan Indianapolis area in major hospitals where our campuses are located. At steady state, we expect there to be at least eighty-four (84) students annually in clinical rotations statewide, not at Indianapolis.

Discussions have begun with hospital administrators and physicians in two regions where a regional medical school campus does not currently exist. These new potential "clinical" campuses would include Reid Hospital in Richmond, IN; and Floyd Memorial and Clark Memorial Hospitals in New Albany IN and Clarksville, IN, respectively. These are areas of physician shortages yet each carries a population base and excellent hospital facilities that would be ideally suited for clinical education of medical students. In addition, it would provide students with experiences among community physician practices for comparable careers after residency training.

3. Faculty and Staffing Model

The Center Director, in the role of the chief academic officer at the regional medical school campus, will oversee the third- and fourth-year clinical clerkships. Each clinical center will need a Clinical Coordinator to coordinate these clerkships. The responsibilities of this coordinator will include: assisting with the educational programming; acting as a liaison among campuses; assisting the clerkship directors in recruitment and retention of community-based volunteer faculty; acting as an administrative liaison among the students, faculty, and administration of the regional campuses and the hospitals; and ensuring all faculty achieve volunteer or adjunct appointments in the Indiana University School of Medicine.

All clinical clerkships at the regional centers will each require an assistant clerkship director for each specialty rotation. The assistant clerkship director will be responsible for delivering the educational objectives of the clerkship; assuring adequate patients for teaching; recruiting necessary community-based volunteer faculty from the medical staff; mentoring the medical students; and providing individual, career, or academic counseling as needed. Assistant clerkship directors will be responsible for reviewing all evaluations of medical student performance, test results, competency evaluations, and other evaluative materials, prior to subsequent forwarding to clerkship and competency directors in IUSM Indianapolis, where final grades for the clerkships and rotations are determined.

Community-based practicing physicians will be recruited as volunteer faculty for the clinical rotations. These individuals will earn volunteer or adjunct faculty appointments; gain access to the Ruth Lilly Library resources; and participate in the IUPUI academic e-mail systems.

Due to the overall increased number of students in our IUSM expansion plans, the Offices of Medical Education and Curricular Affairs, Medical Student Affairs, and the Simulation Center will need additional personnel and funding.

4. Housing for students in clerkships at the eight centers

Medical students who rotate for 4-6 week clerkships at campuses away from their home base will require housing provided by the IU School of Medicine or the host campus or hospital.

5. Specific New Programs at the Regional Centers

IUSM intends to enhance the curriculum of its regional education campuses with emphasis upon the health and medical needs of their community's population, whether urban, rural, or underserved. For example, the School has already implemented a Rural Health education program at the Terre Haute Center to ensure that Indiana's rural communities are served with adequate numbers of primary care physicians. In addition, our Northwest Center's curriculum will emphasize urban medicine and health disparities among economically challenged urban population. A team of experts from IUSM-Northwest and the Dean's Office of Medical Education and Curricular Affairs are together developing a new curricular theme for the regional campus.

Costs and Budget Overview

The statewide infrastructure of IUSM provides an attractive economical model to expand the enrollment of medical students to provide the state of Indiana with its requisite physicians to care for its citizens. The proposed budget would serve as an increase in base support to the medical school, so IUSM can accomplish the expansion goals as described.

The budget presented below outlines the costs of the plan annually until it reaches full implementation in 2016. The budgeted dollars are driven by: number of clerkships and the enrollments in those clerkships by center and location. Understandably, in this revised model, some projections could potentially change, depending upon: success in recruiting volunteer preceptors; participation of regional and critical access hospitals; and student enrollments in the various clerkships and electives. IUSM's experience delivering medical education statewide provides cost-effective regional platforms for this expansion plan.

INDIANA UNIVERSITY SCHOOL OF MEDICINE
MEDICAL STUDENT ENROLLMENT EXPANSION
REVISED IMPLEMENTATION PLAN: BUDGET VERSION 25AUGUST2009

		Single Campus Cost (FY 2010)	Fiscal Year: 2010 All Centers	2011 All Centers	2012 All Centers	2013 All Centers	2014 All Centers	2015 All Centers
	EXPENDITURE BUDGETS							
1	**Existing RMC Operating Budgets**		$ 13,702,690	$ 14,048,677	$ 14,470,138	$ 14,904,242	$ 15,351,369	$ 15,811,910
	Expansion Budget Requirements							
	1st and 2nd Year Expansion Costs:							
2	Total Increased Absentia Fees		$ 37,528	$ 41,806	$ 46,497	$ 50,891	$ 100,046	$ 189,169
3	Total Increased Facilities Operating Costs		$ 1,082,954	$ 1,126,272	$ 1,171,323	$ 1,218,176	$ 1,266,903	$ 1,925,906
	Subtotal - 1st and 2nd Year Expansion Costs		$ 1,120,482	$ 1,168,078	$ 1,217,820	$ 1,269,068	$ 1,366,949	$ 2,115,075
	3rd and 4th Year Expansion Costs:							
4	Clinical Coordinator (salary plus fringe)	$ 100,000	$ 400,000	$ 832,000	$ 973,440	$ 1,012,378	$ 1,169,859	$ 1,216,653
5	Clerkship Costs	$ 25,000	$ 775,000	$ 1,144,000	$ 1,324,960	$ 1,574,810	$ 1,959,513	$ 2,037,894
6	Payment to Clinical Instructors (Community MDs) *(IUSM Clin. Teaching Cost @ mkt rates / 280 students * 84 new students / 82 clerkships)*	$ 123,659	$ 3,624,319	$ 5,349,963	$ 6,954,952	$ 8,942,803	$ 11,625,645	$ 13,797,588
7	Regional clinical competency evaluations and simulations		$ 16,800	$ 17,472	$ 22,714	$ 42,520	$ 44,221	$ 51,099
8	Facilities Costs for New/Expanded Facilities *(5000 s.f. * $23.00/s.f. annually, incl. utilities)*	$ 115,000	$ 460,000	$ 837,200	$ 870,688	$ 1,164,234	$ 1,345,337	$ 1,399,151
9	Administrative Costs at the RMCs *(Incl. one clerical posn, one I/T posn, one development posn. phones, computers, etc.)*	$ 121,823	$ 469,272	$ 976,086	$ 1,142,020	$ 1,187,701	$ 1,372,455	$ 1,427,353
10	IUSM Central Admin. Costs (Includes All 4 yrs)	$ 184,626	$ 1,720,067	$ 1,788,870	$ 1,860,425	$ 1,934,842	$ 2,012,236	$ 2,092,725
11	Housing for 8 students/campus based on renting 4 apartments for a year that would accommodate the students ($80k/campus)	$ 80,000	$ 320,000	$ 332,800	$ 692,224	$ 809,902	$ 842,298	$ 973,322
12	Faculty Development	$ 15,000	$ 80,000	$ 140,400	$ 146,016	$ 151,857	$ 175,479	$ 182,498
13	Testing Materials (1st and 2nd yr students)	$ 5,920	$ 29,600	$ 1,471	$ 2,520	$ 3,837	$ 5,353	$ 8,908
14	Testing Materials (3rd and 4th yr students)	$ 3,300	$ 13,200	$ 13,728	$ 32,124	$ 37,121	$ 34,745	$ 40,150
	3rd and 4th Year Expansion - Total Cost	**$ 784,948**	$ 7,888,259	$ 11,433,990	$ 14,022,082	$ 16,862,004	$ 20,587,139	$ 23,227,341
	TOTAL - Base (Ongoing) Expansion Budget Requirements		$ 9,008,741	$ 12,602,068	$ 15,239,902	$ 18,131,072	$ 21,954,088	$ 25,342,416
	TOTAL - RMC EXISTING AND EXPANSION EXPENDITURE BUDGET REQUIREMENTS		$ 22,711,431	$ 26,650,745	$ 29,710,040	$ 33,035,314	$ 37,305,457	$ 41,154,326
	LESS:							
	Existing Regional Medical Campus + Medical Sciences Program Budgets		$ 13,702,690	$ 14,048,677	$ 14,470,138	$ 14,904,242	$ 15,351,369	$ 15,811,910
15	Total Tuition Revenue from Expansion (70% R; 30% N-R)		$ 2,272,270	$ 2,991,294	$ 3,525,739	$ 4,170,050	$ 5,159,358	$ 6,221,139
16	Cost Share - Host Campuses: Total Increased Absentia Fees		$ 37,528	$ 41,806	$ 46,497	$ 50,891	$ 100,046	$ 189,169
17	Cost Share - Community MDs: Payments to Clinical Instructors		$ 3,624,319	$ 5,349,963	$ 6,954,952	$ 8,942,803	$ 11,625,645	$ 13,797,588
18	Cost Share - Hospital Partners: Facilities Costs for New/Expanded Facilities		$ 460,000	$ 837,200	$ 870,688	$ 1,164,234	$ 1,345,337	$ 1,399,151
	Less Total Existing Funding Sources, New Tuition Revenue, and Cost Shares		$ 20,096,807	$ 23,268,940	$ 25,868,013	$ 29,232,221	$ 33,581,755	$ 37,418,958
	TOTAL - REGIONAL MEDICAL CAMPUS FUNDING REQUEST		$ 2,614,624	$ 3,381,805	$ 3,842,027	$ 3,803,093	$ 3,723,702	$ 3,735,368

Footnotes/Assumptions:

1 State line item budget, inflated at 3.0% per year beginning FY 2012.
2 Represents only absentia fees charged for expansion (additional) students at RMCs where host institution assesses this fee. Inflated at 4.0% per year.
3 Represents only cost of new FL Wayne facility and new South Bend facility for which there was no plant expansion funding provided by the State.
4 Assumes one clinical clerkship coordinator per RMC starting at $71,124 plus fringe benefit costs. Inflated at 4.0% per year. Each RMC's clerkship coordinator assumed hired one year prior to students being enrolled in its clerkships.
5 Some RMCs assumed to have 11 clerkships, other RMCs assumed to have less. 11 clerkships per RMC at $25,000 per clerkship = $275,000 per RMC. Inflated at 4.0% per year.
6 Applies FY 2006 IUSM 3D Cost of Education Analysis by dividing $33,800,000 total clinical teaching cost by 280 students to arrive at a cost per clinical student (3rd or 4th year) of $120,714, or an average cost per RMC of $1,013,832, and
7 To reimburse students for cost of traveling to other RMCs to take clerkships. Assumes 15% of expansion students traveling to other RMCs in any given year for this purpose. Assumes $1,000 annual cost per traveling student. Inflated at 4.0% per year.
8 These facilities costs represent space required for 3rd and 4th year students to assemble for group didactic teaching and other required functions. Inflated at 4.0% per year.
9 Additional administrative costs result from a 30% increase in students.
10 Additional administrative costs result from a 30% increase in students.
11 To cover the cost of temporary housing for students who are traveling to RMCs other than their assigned/home RMC for the purpose of taking clerkships. Inflated at 4.0% per year.
12 To cover the increased cost to central organizations, such as MECA and he Office of Faculty Affairs and Professional Development of providing faculty development and training opportunities to RMC faculty, including volunteer faculty. Inflated at 4.0% per
13 To cover costs of additional NBME exams at $40 per exam plus a $100 score charge per respective discipline for only additional 1st and 2nd medical students.
14 To cover costs NBME exams at $40 per exam plus a $100 score charge per respective clerkship for only additional 3rd and 4th medical students.
15 Projection of tuition paid by expansion (additional) students, assuming 70% are residents and 30% non-residents. Begins with actual FY09 tuition and inflates by 4.0% per year.
16 Additional Host Campus charges associated with medical student expansion.
17 Assumes host institutions, hospitals, and community physicians will contribute these costs to IUSM and not charge for them. If this does not occur, IUSM will need to request that support from the State. The worst case scenario if there is no "cost-sharing".
18 Minor renovations to existing RMC facilities needed in order to accommodate increased class size (expansion students). This is a one-time cost.

INDIANA UNIVERSITY SCHOOL OF MEDICINE
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REVISED IMPLEMENTATION PLAN: BUDGET VERSION 25AUGUST2009

1ST AND 2ND YEAR Medical Student Headcount Expansion Plan By Regional Medical Campus

Biennium:		2007-09		2009-11		2011-13		2013-15			
Fiscal Year:		2008	2009	2010	2011	2012	2013	2014	2015		
Matriculation Year:		2007	2008	2009	2010	2011	2012	2013	2014		
Graduation Year:		2011	2012	2013	2014	2015	2016	2017	2018	New Students	Expansion Total
Regional Medical Campus	Current Students										
IUSM-Terre Haute otco ISU	16	6								8	24
IUSM-Muncie otco BSU	16	6	2							8	24
IUSM-Ft. Wayne otco IPFW	16			5	3	6	2			16	32
IUSM-South Bend otco UND	16		6	2			6			14	30
IUSM-Evansville otco USI	16							4	4	8	24
IUSM-Lafayette otco PU	16							4	4	8	24
IUSM-Northwest otco IUNW	18		6	2				2	4	14	32
IUSM Medical Sciences Program - Bloomington	28			5	3					8	36
IUSM-Indianapolis	138									-	138
Total	280	14	14	14	6	6	8	10	12	84	364
Total School		$ 294	$ 308	322	328	334	342	352	364		

3RD AND 4TH YEAR Clerkship Expansion Plan By Regional Medical Campus

Biennium:		2007-09		2009-11		2011-13		2013-15		
Fiscal Year:		2008	2009	2010	2011	2012	2013	2014	2015	
Matriculation Year:		2007	2008	2009	2010	2011	2012	2013	2014	
Graduation Year:		2011	2012	2013	2014	2015	2016	2017	2018	
Regional Medical Campus										Projected Clerkship Capacity by Site
IUSM-Terre Haute otco ISU				6	5					11
IUSM-Muncie otco BSU							2	4		6
IUSM-Ft. Wayne otco IPFW				6	5					11
IUSM-South Bend otco UND			8	3						11
IUSM-Evansville otco USI						3	3	5		11
IUSM-Lafayette otco PU						2	2	2		6
IUSM-Northwest otco IUNW			1	7	3					11
IUSM Medical Sciences Program - Bloomington									8	8
IUSM-Richmond						3	3	3	2	11
IUSM-New Albany						3	3	3	2	11
IUSM-Indianapolis										
Total New Clerkships		0	9	22	13	11	13	17	12	97

Indiana Innovation Alliance
Purdue University--Technical Assistance and Advanced Education
$2,000,000 2009-10 $2,000,000 2010-11

Purdue proposes to use Indiana Innovation Alliance funds to support three specific programs: pharmacy residency in communities across Indiana, post graduate specialized education in biomedical engineering, and technical assistance to rural hospitals. These elements are described below.

I. Postgraduate Pharmacy Residency

We propose to establish 20 postgraduate pharmacy residents in at least 15 training sites across Indiana. This will enable us to reduce the 'brain-drain' of pharmacy graduates seeking advanced training and improve healthcare outcomes. As the complexity and cost of pharmaceuticals continues to increase, the need for pharmacists with advanced training becomes increasingly important in assuring optimal healthcare outcomes.

The training cycle for postgraduate pharmacy residents is July 1 to June 30. December is the key recruitment month and the first group of residents would begin July 1, 2010. Purdue will immediately hire a faculty coordinator and support staff, negotiate agreements with residency sites, recruit candidates, and develop a reporting and evaluation structure.

Tentative sites at which we plan to place residents are indicated below. We have had preliminary discussions at several of these sites, each of which has expressed high interest in partnering with Purdue in postgraduate residency training. Final site selection will depend on successfully completing collaboration agreements with the residency institutions. Some sites may have two residents, and more sites may be identified. In the event a collaborative agreement cannot be reached with a particular institution, we will place multiple residents at other locations or add new sites.

Proposed Pharmacy Residency Sites	Location	Setting
Clarian/Arnett	Lafayette	Health System
Fagen Pharmacy	Valparaiso	Community
Freedom Pharmacy	Indianapolis	Long Term Care
Good Samaritan	Vincennes	Health System
Lutheran Health	Fort Wayne	Health System
Medco	Zionsville	Mail-Order
Memorial Health	South Bend	Health System
Porter	Valparaiso	Health System
St. Anthony Memorial	Michigan City	Health System
St. Mary's	Evansville	Health System
Supervalu	Northwest IN	Community
Union Hospital	Terre Haute	Health System
Williams Brothers	Washington	Community
Wishard Health Services	Indianapolis	Health System

II. Post-Graduate Specialization in Biomedical Engineering

For more than 30 years, Purdue biomedical engineers have been making technical breakthroughs that improve the lives people around the world. Implantable defibrillators, natural tissue repair devices, implantable drug delivery systems, and novel artificial joints are just a few of the

technologies designed and developed by the Weldon School of Biomedical Engineering. Rapidly evolving technologies in biomedical engineering has created a need for an advanced education and professional development masters program targeted specifically toward working engineers and scientists.

Target Audience. Purdue will offer a masters-level training program aimed at working engineers and scientists, with a focus on enhancing technical and scientific skills and knowledge that will advance their careers in the broad fields of biomedical engineering, bioengineering, and biotechnology. A wide range of professionals are expected to take advantage of this non-thesis degree training. Useful background for this degree will include experience or undergraduate coursework in basic biology, mechanics, electronics, and statistics/probability.

A unique feature of this program will be its emphasis on practical regulatory affairs at both the initial approval and compliance stages. Students will gain valuable in-depth knowledge of regulatory requirements as well as guided practice with effective regulatory document submissions. This advanced education in quality and regulatory compliance will prepare students for rapid integration into regulatory affairs teams in critical areas of the medical products industry.

We anticipate that the majority of the students enrolling in this program will be working in, or associated with Purdue partner companies. Purdue currently has over 30 partner companies throughout Indiana (e.g., in Bloomington, Warsaw, Fort Wayne, Batesville, Indianapolis) and an even larger regional pool, from which to draw students.

Faculty. Faculty for this masters program will come primarily from the Weldon School of Biomedical Engineering, with additional expertise available through the various schools of engineering that participate in Engineering's distance education programs. Additional content and specialized training will come from experts selected from our partner companies.

Degree Objectives. Professionals completing this Purdue Biomedical Engineering specialization program will possess:

- New technical and scientific knowledge in biomedical engineering
- Skills in translating ideas into medical products
- Demonstrated ability to prepare regulatory documentation
- Heightened awareness of emerging technologies and novel biomedical engineering applications

This degree will require 30 credit hours of coursework. Of these, 18 credits must be in engineering. Following admission, each student will have responsibility to develop a plan of study requiring approval of their academic advisory committee.

Delivery Format. Courses will be available primarily through streaming video over the internet and downloadable MPEG-4 files. Enrolled students will be able to interact with course materials at any time and place during the semester. Students also can interact with faculty and staff through electronic communication avenues. This format provides a nearly unlimited capacity for student participation with a dedicated focus on the working engineer/scientist.

Future Business Model. Our goal is to grow enrollment to where this specialized training program becomes self-sustainable in terms of faculty and staff support. In the steady state, some

additional support will likely be required for infrastructure staff support, technology upgrades, as well as ongoing marketing and promotion. At some point after the initial roll-out period we anticipate the enrollment will be 20 to 30 participants per course. Not all of these will be pursuing the full M.S.E. / M.S. degree training. Some may be only seeking to upgrade specific skills areas or technical deficits. By offering an average of five courses per year, at our projected steady state enrollment, we project that the registration revenues will generate a revenue stream sufficient to sustain the instructional costs of the program. Approximately $100,000 additional revenue will be needed to pay for equipment upgrades and maintenance, continued course development, marketing and promotion.

III. Technical Assistance to Rural Healthcare Providers

Applying science and engineering principles to healthcare delivery reduces costs. These strategies contain costs by implementing best practices and developing more efficient healthcare systems, without compromising care. Purdue's Healthcare Technical Assistance Program (HTAP) has developed training and management tools that are quite effective in reducing costs in hospitals and other healthcare organization. The cost of this program is typically about $25,000 and is typically recovered within 6 to 12 months. Rural hospitals have been slow to implement this program.

Program Delivery: Healthcare TAP is prepared to start immediately to:

- Deliver its Lean Healthcare curriculum to approximately 40 rural and critical access hospitals over the next two years. The primary objectives will be to: a) improve clinical quality, productivity, and safety, b) contain operating expenses, and c) help keep rural hospitals open.
- Deliver the curriculum to approximately 800 employees. Each participant will receive the HTAP Lean Healthcare certificate. CEU's are available.
- Assist participating employee with projects that address enhanced productivity and regulatory compliance, including new Medicare and Medicaid regulations

Expected Training Outcomes: Recent examples of training outcomes with several hospitals include the following:

- Operating Room savings of $1 million in supply costs within 6 months
- Overtime savings of $100,000
- Increased productivity by 12%
- Decreased patient wait time by 30%
- Decreased overtime pay by 30% within six months
- Decreased "admit to bed" time by 50% (before completion of the training).

HTAP will target 40 hospitals in rural communities at an anticipated average cost of $25,000 each, for a total of $1 million over two years ($500,000 each year).

Proposed Budget

Program	2009-10	2010-11
Postgraduate Pharmacy Residency		
Faculty and staff salaries & benefits	$200,000	$200,000
Resident salaries & benefits (20@ $65,000)	NA	1,300,000
Post-Graduate Specialization in Biomedical Engineering		
Curriculum Development	200,000	150,000
Infrastructure Development	200,000	50,000
Instructional Support	150,000	250,000
Administrative Support	100,000	100,000
Engagement and Marketing	50,000	50,000
Totals	700,000	600,000
III. Technical Assistance to Rural Healthcare Providers		
HTAP assistance costs (20 per year @$25,000)	500,000	500,000
Totals	$1,400,000	$2,600,000
Two year total	$4,000,000	

Appendix 1: Biomedical Device and Bionanotechnology Core

Commercialization and Industrial Interactions

Private Sector Collaborators: Cook (Bloomington and West Lafayette), Biomet (Warsaw), Depuy (Warsaw), Zimmer (Warsaw), Hill-Rom (Batesville), Aptuit (West Lafayette), Ft. Wayne Metals (Ft. Wayne), Nanovis (West Lafayette), Intelliphage (West Lafayette), BioVitesse (West Lafayette).

Start-up Companies: The following new companies in the life sciences sector have been assisted or enabled by Discovery Park or the Weldon School for Biomedical Engineering at Purdue University.

BioVitesse, Akina (drug delivery), Andara Life Sciences (spinal cord repair), Moerae Matrix (molecular therapeutics), Cook Biotech (tissue engineering), Nano Vis (orthopedics), SonarMed(critical Care), Glytrix (wound healing).

Examples of Recent Invention Disclosures at Purdue in the Life Sciences: The following is a selection of Purdue invention disclosures relating to biomedical devices or bionanotechnology submitted during the first six months of 2009:

- Use of an MK2 Inhibitor to Enhance Nerve Regeneration
- Development and application of purified collagen technology
- Collagen-Binding Peptidoglycans for Wound Healing
- Biomimetic biodegradable scaffolds for the enhancement of nerve & tissue regeneration
- A Diagnostic Tool for Detection of Otitis Media
- A Device that is Used for the Immediate Onset of Hypoglycemic Events
- An Alarm System for Injecting an Anti-Hypoglycemic Solution
- A Device that Injects an Anti-Hypoglycemic Solution
- Living Cell Biosensor Using Electrochemical Detection of Pyocyanin
- Variable Volume Mixing and Automatic Fluid Management for Programmable Microfluidics
- AFM-Coupled Microscale Radiofrequency Probe for Magnetic Resonance Imaging Spectroscopy
- Directed Attraction and Wiring of Neurons to Implanted Electrodes by DSCAM-Silica Sol-Gel Coatings
- Miniature Stent-based Implantable Wireless Monitoring Devices
- A nanofluidic channel with embedded transverse nanoelectrodes
- Effective Repair of Traumatically Injured Spinal Cord by Block Copolymer Micelles: A Pilot Study
- Ultra-Soft Atomic Force Microscope (USAFM) for Biological Applications

Purdue Nanotechnology Resources in Discovery Park and the Weldon School of Biomedical Engineering

Weldon School of Biomedical Engineering at Purdue University

The Weldon School of Biomedical Engineering at Purdue University is built on a tradition of applied research with significant industrial and clinical ties. The School is rapidly expanding its educational programs, research capacity, and extramural partnerships to meet a broader set of healthcare and life science needs. This expansion over the past decade includes hiring 20 new faculty members, tripling the size of its graduate programs, and constructing a $25M state-of-the-art facility. Through this strategic growth, the Weldon School is positioning itself at the academic forefront of engineering applied to medicine. A culture of innovation and entrepreneurship in biomedical engineering at Purdue has been fostered for over 30 years, beginning with the formation of the Hillenbrand Biomedical Engineering Center by Leslie Geddes in 1974. This culture is maintained today as evidenced by collaborative development projects between AMIPurdue and four different BME faculty members, the continuous stream of disclosures and the numbers of startup companies formed around Weldon School disclosures. Located across the street from Purdue's Discovery Park, The Weldon School is situated ideally to impact the Biomedical Device and Bionanotechnology Core.

Discovery Park at Purdue University

The Birck Nanotechnology Center is one of nine core centers in Purdue's $400M 40-acre Discovery Park. Discovery Park provides an intellectual environment and facilities for multidisciplinary approaches to interdisciplinary challenges and opportunities spanning the domains of energy, the environment, healthcare, economic development, information access and homeland security. *Discovery* is intimately coupled with *delivery* in Discovery Park. Whether it be commercialization, community outreach, public policy, education or clinical translation, researchers in Discovery Park have their sights set on impact, and the resources and expertise needed to expedite the process to impact are integrated into the fabric of Discovery Park.

The Birck Nanotechnology Center in Discovery Park

Overview. The Birck Nanotechnology Center (BNC) is an interdisciplinary research unit that provides infrastructure for 160 affiliated faculty members and their research groups from 36 academic units at Purdue. The new 187,000 sq ft. facility includes a 25,000 sq. ft. ISO Class 3-4-5 (Class 1-10-100) nanofabrication cleanroom – the Scifres Nanofabrication Laboratory – that includes a 2,500 sq. ft. ISO Class 6 (Class 1000) pharmaceutical-grade biomolecular cleanroom. In addition to the cleanroom, the facility provides 22,000 sq. ft. of specialized laboratories and offices for 45 resident faculty members, 30 post-docs, 30 staff, and approximately 200 graduate students. A flexible Nanotechnology Incubator lab may be leased by companies through the Purdue Research Foundation.

All of the equipment in the BNC is shared, and is accessible to qualified and trained users from Purdue and from academic, industrial, and government laboratories outside Purdue. Most of the major equipment is available through recharge centers that support maintenance, supplies and the time of dedicated staff scientists. Support for the facility, equipment, and processes is provided by a staff of 24 scientists, engineers, and support personnel with over 425 years of experience in academia and industry. Five of these staff members are Ph.D.-level scientists.

The Scifres Nanofabrication Laboratory

Cleanroom. The nanofabrication cleanroom consists of 25,000 sq. ft. of bay-chase cleanroom, with 45% of the bays operating at ISO 3 (Class 1), 40% operating at ISO 4 (Class 10), and the remaining 15% operating at ISO 5 (Class 100). The three-level structure consists of a full subfab, the cleanroom level, and an air-handling level above the cleanroom. A perforated raised floor ensures unidirectional airflow and bulkhead-mounted equipment separates operational functions from maintenance functions. A combination of careful control of the airflow path, multiple stages of filtration, careful choice of materials, and non-ionic-steam humidification ensure the control of both particulate and molecular contamination. A very tight waffle slab provides NIST "A" vibration rating, approximating quiet, slab-on-grade construction.

Lithography. Lithographic capability spans the nano and micro scale, with the capability of integrating nanoscale structures within micro-scale devices. A Vistec VectorBeam VB-6 UHR-UWF electron-beam lithography system provides the capability of 6 nanometer lines in resist across a 1.3 mm field. A Raith e-beam nanolithography system is scheduled to arrive in December 2007, and will provide 20 nanometer resolution. An interference lithography system provides 100 nanometer resolution for less-critical operations.

Optical lithography is used in many operations in BNC, and is supported by a maskmaking operation and single- and double-sided mask alignment. 10x and 5x Criss-Cross Pattern Generator/Step-and-Repeat maskmaking systems, coupled with specialized image-reversal systems, provide a variety of photomasks to support research efforts.

Etching. Wet- and dry-etch capabilities allow the etching at high aspect ratios in a variety of materials. Two STS DRIE systems, a xenon difluoride etcher, an Oxford PlasmaTech system, and a Panasonic chlorine/fluorine system anchor the etching capabilities.

Deposition. Metal deposition is a strength in the BNC. Six evaporators and three sputterers allow the deposition of more than 20 different materials. Additionally, plasma-enhanced deposition systems and an LPCVD system provide further capabilities. Of special interest are two atomic-layer-deposition (ALD) systems designed especially for high-integrity high-k dielectric films.

Furnaces. A three-tube bank of process furnaces include clean (i.e., gate) oxidation, LTO, and LPCVD capabilities. This is supplemented by a separate two-tube pyrogenic oxidation system and several smaller high-temperature tubes and lower-temperature annealing tubes. Low temperature annealing and activation can be performed on two rapid-thermal-processing systems.

Ultra-Pure Water. The ultra-pure water (UPW) system at BNC supplies all laboratories and the cleanroom with incredibly pure water. Termed nano-grade water, this water is below the measurement limits of 15 parts per trillion of boron, the ion most loosely bound to the mixed beds and therefore the most likely ionic impurity in the water. This water also contains less than 225 parts per trillion of total oxidizable carbon (TOC) and less than 1 part per billion of dissolved oxygen.

Biocleanroom. Integrated into the Scifres Nanofabrication Laboratory is a pharmaceutical-grade cleanroom to allow sterile processing. This cleanroom is entered through a separate gowning room and has a completely separate air-handling system, but has a pass-through to the nanofabrication cleanroom to allow materials to be transferred into this facility without breaking cleanliness. Designed for sanitization, it trades a perforated floor for coved sheet-vinyl flooring and boasts a special pharmaceutical wall and ceiling system. Outside the entrance to the biocleanroom is an enclosed overhead walkway to Bindley Bioscience Center.

Specialized Laboratory Facilities

Overview. In addition to the cleanroom, the BNC includes a suite of specialized laboratories that provide outstanding capabilities to researchers. All BNC laboratories are designed for low acoustic noise, less than 1 milligauss EMI, and +/- 1 degree C temperature stability. Additionally, the first-floor laboratories achieve NIST A vibration rating. From this base, certain laboratories have been modified to provide even more stringent limits to accommodate specialized needs. For example, the TEM laboratory has tighter temperature controls, has specialized airflow patterns, and has special acoustic materials on the walls and floors.

Hall Nanometrology Laboratory and Scanning Tunneling Microscopy. For highly sensitive functions, the Kevin G. Hall Nanometrology Laboratory provides enhanced control of temperature, vibration, acoustic noise, and EMI. Temperature is controlled to +/- 0.01 degree C, EMI is controlled to less than 0.1 milligauss, acoustic noise is within NC-35 criteria, and vibration is controlled to NIST A-1 criteria. An Omicron UHV Scanning Tunneling Microscope located in the laboratory allows the study and manipulation of materials on the atomic scale.

Scanning Laser-Doppler Vibrometry. A specialized laboratory that meets NIST A-1 vibration criteria houses the Scanning Laser-Doppler Vibrometer. The Polytec MSA-400 Micro System Analyzer uses a variety of methods to characterize motion in micro- and nanostructures.

Scanning Probe Microscopy. Seven atomic force microscopes provide topographical data on surfaces as well as allowing the manipulation of materials at the nano scale.

Electron Microscopy. Four electron microscopes provide the ability to image nanoscale devices and materials, as well as to study reaction mechanisms at the atomic scale. An FEI Titan 80-300 keV Field Emission Environmental Transmission Electron Microscope – Scanning Transmission Electron Microscope provides resolutions to 0.7 by 1.0 Angstrom units. The system contains an in-situ reaction chamber, and is equipped with a high-performance camera and data server.

Supplementing the capabilities of the Titan are an FEI Field-Emission Scanning Electron Microscope, an FEI "Novalab" Focused Ion Beam – Scanning Electron Microscope system, and a dual-function JEOL Scanning Electron Microscope with electron-beam direct-write capability.

Surface Analysis. The surface analysis laboratory contains a Kratos Imaging x-Ray Photoemission Spectrometer (XPS) with an in-situ reaction cell and an Omicron surface analysis cluster tool. The XPS has a 15 micrometer spot size, and provides atomic-level analysis of materials. The cluster tool contains multiple devices to characterize the surfaces of materials, including a high-resolution electron-energy-loss spectrometer (EELS), a scanning electron microscope (SEM), a scanning auger spectrometer, a hemispherical electron spectrometer for XPS, AES, UPS, ISS, and a focused ion beam (FIB) system – all connected under ultra-high vacuum.

x-Ray Diffraction. The x-ray diffraction laboratory contains a high-resolution PANalytical "x"Pert Pro x-ray diffraction system.

Epitaxy. Several BNC laboratories contain equipment for specialized, highly precise epitaxial growth. A Varian Gen II Molecular Beam Epitaxy system for III-V epitaxy, an Epigress VP-508 hot-wall CVD reactor for SiC, and an Aixtron AIX 200/4 metal-organic chemical vapor deposition (MOCVD) system for GaN, allow the growth of a variety of homoepitaxial and heteroepitaxial materials .

Deposition. An ASTeX plasma-enhanced chemical vapor deposition system allows film growth of specialized materials.

Biosafety Level 2 Laboratories. The BNC has two biosafety level 2 laboratories, one containing two tissue-culture rooms that operate at biosafety level 2+. These specialized laboratories allow for the safe handling of biological materials used in the development of devices and delivery methods.

Biosafety Level 1 and Nanochemistry Laboratories. The BNC also provides four laboratories for less hazardous nano-bio and nanochemistry research. These laboratories, classified at BSL-1 or below, are used for both mechanical and wet-chemical research activities.

Electrical Characterization Laboratories. A significant amount of BNC laboratory space is allocated to electrical characterization. From a soon-to-be-operational 8 Tesla, liquid-helium-cooled Hall Effect measurement system to multiple shielded probe stations with hot and cold testing capabilities, these laboratories provide the equipment and facilities necessary to evaluate new materials, structures, and devices.

Laser Laboratories. Specialized laboratories for optical materials development, optically enhanced deposition, and optical characterization methods have been implemented in the BNC. Using lasers of various power levels – up to Class 4 – BNC researchers are able to develop materials, processes, and devices for energy conversion and other applications. These laboratories also support research strengths in nanoelectronics and nanophotonics.

Nanoincubator Laboratory. The BNC provides flexible laboratory space that can be leased by companies through the Purdue Research Foundation. This space is designed to provide a secure, specialized laboratory for companies wishing to use the infrastructure of the BNC while maintaining private laboratory space for specialized or proprietary work.

Indiana University Nanotechnology Resources

IUB NANOSCIENCE CENTER

Research in Self-Assembly at Indiana University

The strength of Purdue University is in device development. An emerging strength at IU, which is complementary to Purdue's strength, is in self-assembly. IU has several well-established groups investigating assembly processes in natural and synthetic systems. How molecules assemble to form complex functional systems, from viruses, to cells, to humans is poorly understood. We are developing a physical, chemical, and biological understanding of these processes. With this knowledge we should be able to mimic these capabilities in artificial systems and develop applications in drug delivery, biomedical engineering, electronics, optics, and related fields. This research effort is multidisciplinary and brings together research groups from Chemistry, Physics, and Biochemistry.

Self-assembly often spans a wide range of length scales and time scales. The wide range of scales involved makes it difficult to study, and there is a lack of suitable tools. To fill this void, groups at IU are developing new analytical methods and theoretical tools to investigate self assembly. Knowledge of assembly processes is expected to lead a number of applications, including therapeutic opportunities (antiviral vaccine development). In addition, these studies will lead to potential opportunities in drug delivery, for example using virus capsids as delivery vectors to carry a drug to its target, such as a cancer cell. Another application of this research is in the development of novel materials: For example, metamaterials with unique optical dielectric properties can be made by self-assembly. Other groups at IU are investigating self assembly on surfaces. These studies can lead to surfaces with tailored properties with potential practical applications, e.g. planes that do not require de-icing. It should also be possible to design surfaces of which certain properties change in response to the environment. Other groups seek to exploit self-assembly of specially designed molecules to achieve tailored molecular architectures or functions such as the conversion of chemical energy into motion. All these studies require a well-developed infrastructure that includes theoretical groups and state of the art characterization tools.

IUB - Nanoscale Characterization Facility

The Nanoscale Characterization Facility (NCF) is housed on the ground floor in Simon Hall, our multidisciplinary sciences building, and has 2000 ft^2 of laboratory space and 1300 ft^2 of clean room space. The NCF will provide faculty, staff, postdoctoral fellows, and graduate and undergraduate students with state-of-the-art instrumentation for generating and characterizing materials having features with nanometer dimensions. We expect the NCF to grow over the next three to five years as a university resource, and the instrumentation within the facility will be available to all research groups at IU.

NCF Equipment (Simon Hall):

JEOL JEM-3200FS Cryogenic Transmission Electron Microscope. The JEOL JEM 3200FS transmission electron microscope (TEM) is an intermediate voltage (300 kV) electron microscope. This electron microscope uses a thermal field emission gun (FEG) as its electron source, providing an extremely bright and coherent beam of electrons for use in imaging and analysis. The 3200FS installed in Simon Hall is equipped with an in-column energy filter and a Gatan UltraScan 4000 CCD camera. In addition to the TEM capabilities of the 3200FS, the instrument is also equipped with scan coils and detectors that allow it to function as a scanning transmission electron microscope (STEM).

FEI Quanta 600F Scanning Electron Microscope. The Quanta 600F scanning electron microscope (SEM) is a versatile, high-performance instrument with three modes (high vacuum, low vacuum, and environmental) to accommodate the widest range of samples of any SEM system. The SEM system is equipped with an energy dispersive spectrometer and electron backscatter detector. In addition, the field emission gun (FEG) system contain a S/TEM detector for bright-field and dark-field sample imaging. The motorized stage has 150mm of travel in the X and Y directions and 60 mm of travel in the Z direction.

JC Nabity Lithography Systems Nanometer Pattern Generation System. The nanometer pattern generation system (NPGS) provides a user-friendly environment for the delineation of complex structures using a commercial electron microscope, e.g., FEI Quanta 600F. The SEM combined with NPGS is a powerful lithography tool for basic research and R&D applications and can be used for the fabrication of a wide variety of devices. Pattern sizes may range from the nanometer scale up to the maximum field of view of the microscope, which can be as

large as 10 mm. There are three basic steps to the pattern generation process: pattern design, parameter run file creation, and pattern writing with alignment for multilevel lithography.

Asylum Research MFP3D Atomic Force Microscope. The MFP-3D integrates optical microscopy and atomic force microscopy (AFM). Sample features are located using brightfield, phase contrast, or fluorescence, then probed at the nanometer scale with an AFM scan. AFM is combined with such powerful optical microscopy techniques as confocal microscopy, including the capability to synchronize with confocal measurements. The superluminescent diode and additional optics minimize interference with fluorescent signals. Advanced software capabilities allow the researcher to display results intuitively in 3D, then use powerful analysis and scripting tools to extract and graph quantitative information.

Asylum Research Cypher Atomic Force Microscope. Cypher is the first completely new small sample atomic force microscope (AFM)/ surface probe microscope (SPM) in over a decade and is the world's highest resolution AFM. The Cypher AFM achieves closed loop atomic resolution using sensors in all three axes, combining the accuracy and control of closed loop with atomic resolution for the most accurate images and measurements possible today. In addition to its superior capabilities for imaging and measurement, Cypher uses point-and-click automated laser and photodetector alignment. Additional unique capabilities include interchangeable light source modules that allow laser spot sizes down to 3 □m for broad application and scan mode flexibility, and support for high-speed AC imaging (>10x faster) with cantilevers smaller than 10 □m. The system also includes an integrated enclosure which provides acoustic and vibration isolation, as well as excellent thermal control for image and measurement stability.

TA Instruments Q5000 Thermal Gravimetric Analysis Instrument. The automated Q5000 is used for complex thermogravimetric analysis (TGA) applications, low-level detection of impurities, kinetic studies, off-gas analysis, and high heating rate operation. Its design integrates a thermobalance engineered for maximum baseline flatness and high sensitivity, with the power and flexibility of an infrared furnace, and a proven horizontal purge gas system. User convenience features include the 25-position autosampler, the integral electromagnet, and software for scheduling automatic calibration, verification and diagnostic tests.

Malvern Instruments Nano-ZS Zetasizer. The Zetasizer Nano-ZS can measure (1) particle size of particles and molecules from 0.6 nm to 6 micrometers using non-invasive back-scatter (NIBS) technology and dynamic light scattering, (2) zeta potential in aqueous and non-aqueous dispersions using M3-PALS technology, and (3) molecular weight with an absolute measurement using static light scattering and the sensitivity from an avalanche-photodiode detector and fiber detection optics. The Nano-ZS can measure all three parameters with no performance compromises and allows measurements of samples with little or no dilution. The unique disposable zeta potential cell ensures no cross contamination of samples.

Bruker VERTEX 70v Fourier Transform Infrared Spectrometer. The VERTEX 70v is equipped with optical components to cover the spectral range from 10 cm^{-1} in the far IR/THz, through the mid and near IR up to the visible/UV spectral range at 28,000cm^{-1}. With its pre-aligned optical components and permanently aligned interferometer, range change is easy and maintenance free. With the evacuable optics bench of the 70v spectrometer, sensitivity in the mid-, near and far IR/THz regions are obtained without masking very weak spectral features caused by water vapor or CO_2 absorptions. Outstanding results, e.g. in the area of nano-science research down to sub-monolayers, can be obtained.

Linde Auto 306 Thin Film Deposition System. The Auto 306 FL400 Thin Film Deposition System is set up for sequential evaporation of up to four materials without breaking vacuum. The pumping system incorporates a 540-liter/sec turbo molecular pump backed by an XDS10 dry running primary pump. A rotary work holder is fitted to the chamber top plate. Film thickness is monitored using a Sigma SQM160 quartz crystal film thickness deposition monitor with digital display of deposition rate and deposition thickness. There is the capability to control up to 2 source shutters automatically and close the electromagnetic source shutter when pre-programmed termination thickness values are achieved. Substrate heating is via 500W Quartz lamp heater assembly with lamp.

Reactive Ion Etching Instruments. The reactive ion etching (RIE) instruments are designed to supply research and failure analysis laboratories with state-of-the-art plasma etch capability using single wafers, dies or parts with fluorine, chlorine, and oxygen-based chemistries. The systems have a compact, modular design built on a space-saving platform. Because metal and compound semiconductor etch processes use corrosive chemistries and are

often sensitive to atmospheric moisture, consistent results as well as safety are achieved by isolating the reaction chamber from the atmosphere.

Veeco Dektak 6M Surface Profiler. The Dektak 6M benchtop stylus profiler incorporates reliability with a low inertia sensor head to provide step height, surface roughness, and waviness measurements for samples up to 150 millimeters. The profiler can accurately measure step heights on any surface, with a programmable stylus force down to 1 milligram and a Z-height capability up to 1 millimeter. In addition, the instrument delivers high horizontal resolution, with up to 30,000 data points per scan. The easy-to-use software interface allows automatic comparisons of analytical results from multiple scans, and calculations of the mean, standard deviation, and maximum/minimum.

OAI 205S and Suss MicroTec MA4Mask Aligner/Exposure Systems. The OAI 205S and Suss MicroTec MA4 mask alignment and UV exposure systems are bench top tools that requires minimal clean room space. Utilizing an air bearing / vacuum chuck leveling system, the substrate is leveled quickly and gently, for parallel photomask alignment and uniform contact across the wafer during contact exposure. The systems are capable of one micron resolution and alignment precision. The alignment module features mask insert sets and quick-change wafer chucks that enable the use of a variety of substrates and masks without requiring tools for reconfiguration. Both systems provide collimated UV light in near UV using 500W lamps.

Focused Ion Beam Instrument. The focused ion beam (FIB) instrument is used particularly in the semiconductor and materials science fields for site-specific analysis, deposition, and ablation of materials. The FIB instrument uses a focused beam of ions, e.g., Ga ions, and is incorporated in a system with both electron and ion beam columns, allowing the same feature to be investigated using either or both beams. Source ions are then accelerated to an energy of 5-50 keV (kiloelectronvolts), and focused onto the sample by electrostatic lenses. When the high-energy gallium ions strike the sample, they will sputter atoms from the surface. Because of the sputtering capability, the FIB is used as a micro-machining tool, to modify or machine materials at the micro- and nanoscale. The common smallest beam size is 2.5-6 nm.

X-ray Diffraction in Extreme Environments. This system utilizes a Rigaku RU-200 Rotating Anode source with both copper and silver anodes. The diffractometer employs a scintillation counter to cover scattering angles ranging from 1-120 degrees. SPECS software is used for data acquisition and Full Prof is available for Rietveld refinements. An Air Products closed cycle refrigerator can be used to carry out measurements between 10 K and 300 K. A Lakeshore Cryotronics temperature bridge provides temperature control with a stability of +/- 0.05 K. Gas handling systems for either integrated adsorption isotherms (0-1 bar) with non reactive gases or high pressure studies (0-100 bar) are available.

Small Angle X-ray Scattering. The S-MAX3000 pinhole SAXS camera is coupled to a Rigaku RU-200 high brilliance rotating anode x-ray generator. A focusing optic provides high fluxes for small sample measurement. A 3-meter, fully evacuated camera length provides both high intensity and high resolution. Coupled with a fully integrated 2-dimensional multi-wire proportional counter, the system is capable of making highly sensitive measurements from both isotropic and anisotropic materials. An automated sample changer is available for measurements of multiple samples. Available sample environments include a water bath and a closed cycle refrigerator.

Small Angle Neutron Scattering. The NBL1-SANS instrument at the Low Energy Neutron Source utilizes a pin-hole collimation and covers a Q-range of 0.005 – 0.5 $Å^{-1}$ with an expected neutron flux of ~$2*10^4$ $n/cm^2/sec$ at the final configuration of the proton accelerator. Sample inhomogeneities on a length scale of 20 -1000Å can be probed. The Sample Area consists of a 71 cm diameter sample rotation table, on which a variety of sample environment equipment can be mounted, such as refrigerator, sample changer, cryostat, sample heater, humidity/temperature chamber, pressure cell, etc., depending on the particular scientific application of the SANS experiment. The Secondary Flight Path consists of an evacuated stainless steel tank (Si entrance window), the 2D detector (manufactured by ORDELA), and a beam stop assembly.

Quantum Design Vibrating Sample Magnetometer. The Quantum Design VSM is a fully automated system for the measurement of sample magnetization of samples in the temperature range of 2K-300K. The system employs a SQUID based magnetometer that is sensitive to magnetization changes as small as 10^{-6} emu. Measurements can be carried out in ambient fields up to 10T. A zero field option is also available. Proprietary Quantum Design software is available for data collection and analysis.

MRI applications: Cryogen-free physical properties measurement system

Other Related Facilities at Indiana University

Molecular Structure Center. The Molecular Structure Center has a full complement of single crystal and powder diffraction equipment used to characterize crystalline materials using the techniques of X-ray crystallography. Researchers in the laboratory can determine the three-dimensional structure of nearly any material that can be crystallized.

Physical Biochemistry Instrumentation Facility. The Physical Biochemistry Instrumentation Facility was established to facilitate research in the structures, stabilities, and interaction of biomolecules and to provide a centralized resource for training and education in modern physical biochemistry. Located in the new, state-of-the-art Simon Hall, it houses state-of-the-art biophysical instrumentation that is available for use by faculty and students.

Mass Spectrometry Facility. The Mass Spectrometry Facility provides top-quality mass spectrometry support to the faculty research groups in the Chemistry Department and at IU. The facility specializes in walk-up mass spectrometry and accurate mass spectrometry of unique samples.

Nuclear Magnetic Resonance Facility. The Nuclear Magnetic Resonance Facility provides high-resolution NMR for a variety of solution-state experiments. The facility supports research in organic, inorganic, biochemical, and materials synthesis. Also, the facility's new 800 MHz spectrometer is a state-of-the-art instrument for structural analysis of biomolecules and biomolecular interactions.

Low Energy Neutron Source (LENS). The Low Energy Neutron Source (LENS) is a novel, university-based pulsed neutron source at the Indiana University Cyclotron Facility. The source utilizes a low energy reaction in Be coupled with a high-current, variable-pulse-width proton accelerator to produce either short or long neutron pulses. A highly optimized moderator produces cold and very cold neutrons for use by a suite of neutron scattering instruments and development facilities.

LENS is a regional university facility for research, innovation, education and outreach with a national impact. The emphasis on cold and very cold neutrons makes it suitable for materials research, particularly in the area of nanoscale structures which are a research focus of many universities in the region. The flexible scheduling and technical resources available at IUCF make it ideal for developing innovative new neutron scattering techniques and instrumentation that will provide national benefits. At the same time, LENS's location in a university environment supports educational development at a local, regional and national level.

Appendix 2: I-BIRD

Current private sector collaborators:

Abbott; Actelion; AEON Imaging; Alcon Labs; Amgen; Antech; Aptuit (SSCI); Ariad Pharmaceuticals; AstraZeneca; Baxter; Beckman; Biogen; BioVitesse; Boehringer-Ingelheim Pharmaceuticals; Boston Micromachines; Bristol-Myers Squibb; Burroughs Wellcome; Celgene; CIVCO; Cook, Inc.; Covance; Cytoviva; DowAgrosciences; Dupont; Eisai; Elan; Eli Lilly & Co.; EntreMed, Inc; Essilor; Genentech; General Electric; Genzyme; GlaxoSmithKline; Green Tech America; IkoTech; Intelliphage; ISIS; Kylin Therapeutics; Kyphon; Medigus; Medivation, Inc; Medtronic; Merck; Millipore; NonoVis; Novartis; Octapharm; PDS Biotechnology; Pfizer; PHILIPS; Physical Sciences, Inc; Pixel Optics; Proacta; Prosolia; Protherics; PTC Therapeutics, Inc; Quadraspec; Quark Pharmaceutical; Repligen; Sanofi-Aventis Pharmaceuticals; Scherring Plough; Semafore; Seyet; Siemens; Sonexa; Teva; Tibotec; TrueFUSE; Wright Medical Technologies

Current new company formation and IP activity:

New companies:

PETNET Indiana LLC was created as a joint venture between PETNET Radiopharmaceuticals (Siemens Medical Systems) and a for profit subsidiary of Indiana University Radiology Associates to provide Positron Emission Tomography Radiopharmaceuticals throughout Indiana and the Midwest region of the United States. PETNET Indiana LLC currently has annual revenues of approximately $1.6M and delivers approximately 8500 radiopharmaceutical doses per year in support of clinical PET imaging procedures . Assuming a typical $2000 technical fee and $225 professional fee reimbursement per clinical PET procedure, PETNET Indiana provides crucial infrastructure support for nearly $19M of annual clinical revenue to hospitals and imaging centers primarily in Indiana with backup support for neighboring states.

INphoton: Light microscopic service oriented company with Phase I and now Phase II NIH STTR funding and 21st Century funding. A very exciting part of this company MO is to work with University faculty to develop R21 and Phase I STTR grants in organs other than the kidney. At present we are working on solid tumor, bone marrow, and liver phase I STTRs.

FAST Diagnostics: Device company based on the ICBM:IURTC patent listed above. Company has received Phase I and II STTR grants, 21st Century and BioCrossroads funding. The company is working in conjunction with Rose Hulman University.

Quarryman Optics was a company that was funded through two phase 1 and a phase 2 funding cycle. The company developed wavefront technology for evaluating the optical properties of the eye, and while it has recently closed its doors, the principles remain well funded from Industrial contacts and efforts that were developed by the company.

AEON Imaging: Aeon Imaging, LLC, is a start-up company incorporated in Indiana for the purpose of creating new knowledge and health delivery in the field of imaging and image display. This company has Phase I and Indiana Economic Development funding. The technology is based on patents allowed in the US, Canada, and Australia, and under examination elsewhere (Elsner AE. Device for Digital Retinal Imaging. US Pat. No. 7,331,669). A second family of patents has been submitted, and a third is in preparation.

Advanced Bioimaging Systems; formed in 2009 to commercialize an innovative label free bacterial imaging and classification technology. The company sponsors proof-of-concept research in the Bindley Bioscience Center and has a proposal pending with the 21 Fund for additional seed investment.

Coferon: intellectual property co-developed at Cornell University Medical College and Purdue led to the foundation of this therapeutics development company that has developed extensive angel investment and is

currently seeking $10M in venture capital funding. The technology will enable rapid development of high affinity chemistries for various disease targets as well as modification of existing chemicals

Intelliphage: a food safety startup with license option for Purdue technology to detect microbial contamination with an engineered and automatically reporting bacterial virus. Company is cooperating with Center for Food Safety Engineering and is developing SBIR and 21 Fund proposals for seed funding.

***Aquascience*:** Focused on products to improve health and efficiency in aquaculture, the company is preparing SBIR funding proposals for USDA. Research and development activity with Purdue's Bindley Bioscience Center is anticipated.

Additional Intellectual Property Disclosures:

Imaging Resolution Recovery Techniques: Patent being submitted

3D Phantom Printing for Performance Evaluation and Standardization of Imaging System in Clinical Trials: Provisional patent application submitted

Fluorescence Technologies, Method and Apparatus for Kidney Function and Analysis

Phantoms for testing and calibration of diagnostic medical imaging systems; provisional patent application

Fluorescence Technologies, Method and Apparatus for Kidney Function and Analysis

Cytospec Software for Analysis of Spectral Data; provisional patent application

Web-based Software Application to Remotely Control an Accessible Microscope System; provisional patent application

Detection of Arthritic Lesions Using Folate-Linked Conjugates; provisional patent application

Image Processing Apparatus and Image Processing Method; provisional patent application

Multiplexed Pathogen Detection; provisional patent application

Virtual Simultaneous Pinhole Scanning Spectroscopic Imaging Using Low-Coherence Enhanced Backscattering; provisional patent submitted.

Development of Lissajous Trajectory Confocal Microscopy; provisional patent submitted.

Compound Raman Microscope; provisional patent submitted.

High Anisotropy-Induced Diffuse Light Suppression for Large-area Microvascular Imaging; provisional patent application

AFM-coupled Microscale Radiofrequency Probe for Magnetic Resonance Imaging Spectroscopy; provisional patent application; provisional patent application.

Ultrasoft Atomic Force Microscope (USAFM) for Biological Applications; provisional patent application.

Multimodal Nonlinear Optical Microscope – integration of coherent anti-Stokes Raman Scattering (CARS), two-photon fluorescence (TPF), second and third harmonic generation imaging modalities; provisional patent submitted.

Detail of current capabilities:

IU Bloomington:

Light Microscopy Imaging Center

BD Pathway 855 High-Content Bioimager
The BD Pathway 855 is a versatile system for automated, high-content confocal imaging of live or fixed samples. It is designed for specimen formats ranging from single slides to multi-well (24-384) plates using confocal fluorescence, widefield fluorescence, and brightfield modes. Equipped for drug and small molecule screens of live cells, this device has an environmental specimen chamber, automated liquid dispensing, an associated robotic plate-loading crane, and CO2 plate holding incubator. Both laser and image-based autofocus coupled with a moving objective lens design combine for minimal specimen agitation. This machine has a proven track record for a broad range of high-content applications. The 855 includes powerful imaging software to perform a broad range of fluorescence-based kinetic and endpoint biological assays.

BD Pathway 435 High-Content Bioimager
This system is similar to the BD Pathways 855, but is specialized for imaging fixed specimens. The device is designed for specimen formats ranging from single slides to multi-well (24-384) plates using confocal fluorescence, widefield fluorescence, and brightfield modes. It can automatically image multiple sites per slide or well and every well of a multiwall plate. It includes the same powerful imaging software to perform a broad range of fluorescence-based endpoint biological assays.

Leica SP5 Laser Scanning Confocal Microscope
This system has 5 sensitive detectors enabling the simultaneous imaging of up to 4 different spectrally resolved fluorescence wavelengths plus a brightfield image. It presently has 3 lasers providing 7 excitation wavelengths (458,476,488,496,514,561 and 633nm) and a prism spectrometer to control emission wavelengths to make this a very versatile system compatible with most combinations of fluorophores. The system is based on a Leica DMI 6000 CS inverted microscope platform and is automated for time-lapse, FRAP, and 3-D image reconstruction.

Spinning Disk Confocal Microscope
The spinning disk imaging system is optimized for live-cell imaging and features a sensitive Cascade-II EM-CCD camera in conjunction with the Yokogawa CSU-10 spinning disk confocal head. The reduced photobleaching and photo-toxicity of this system allows imaging of sensitive specimens over longer time periods. The imaging system is based on a Nikon TE2000U iInverted microscope with a large complement of objective lenses, laser-based illumination for common fluorophores, and a Mosaic FRAP/Photoactivation module from Photonics Instruments Inc. The entire system is driven by MetaMorph imaging software from Molecular Devices.

Nikon C1 Laser Scanning Confocal Microscope
This imaging system is built on the Nikon Eclipse Ti inverted microscope and includes a motorized X-Y stage and the Nikon automated Perfect Focus system. This system is built to maintain focus throughout long-term live imaging experiments. It has three lasers that provide four excitation wavelengths (440, 488, 514 and 543nm) for common live cell probes.

Deltavision Deconvolution Microscope
The Applied Precision DeltaVision Restoration Microscopy System is optimized for deconvolution microscopy. Deconvolution is a software technique that mathematically de-blurs images before reconstructing a 3-dimensional image. This system features a precision motorized stage for control of X, Y, and Z plane movements. Multiple sites on a slide can be marked and revisited. Images are collected on a Photometrics CH350-CCD camera, and the entire device is controlled by the SoftWorx software package.

Veritas Laser Capture Microdissection System
The Veritas LCMD is a fully automated microscope system designed to dissect out microscopic areas of tissue from fixed specimens for later evaluation by molecular biology techniques. This device allows researchers to visualize a specimen and dissect out only the regions of the specimen desired for analysis. Typical applications include examining differential gene expression in local tissue domains from developing or disease affected specimens. The specific device uses both IR-based and laser-cutting based methods for isolating areas of tissue for analysis.

Nikon E800 Widefield Fluorescence Microscope
The Nikon E800 is a general-purpose high-end upright research microscope with a motorized Z-axis stage. It is equipped for brightfield, DIC and epifluorescence imaging. The microscope has 4X to 100X objectives and a Hamamatsu Orca ERII CCD camera driven my MetaMorph software.

Zeiss Axioplan Widefield Fluorescence Microscope
The Axioplan is a general purpose research microscope. It is equipped for brightfield, phase-contrast, and epifluorescence imaging. Images are captured using a Princeton Instruments RTE/CCD camera controlled by the basic Zeiss imaging software

Image Storage and Processing
The LMIC at IU-B houses a 14TByte server (HP) being developed for high-speed secure data transfer and storage. The facility also houses a workstation class PC running the IMARIS imaging package (Bitplane) com-linked to MATLAB for use of in house processing routines.

Ultrastructure Groups in Life Sciences

JEOL JEM-1010 Transmission Electron Microscope (IMBI)
This standard electron microscope has a useful magnification range of 50-500,000x with an accelerating voltage of 40kV-100kV. The microscope is equipped with a tilting goniometer stage for small area electron diffraction.

JEOL JSM-5800LV Scanning Electron Microscope (IMBI)
This SEM has both high and low vacuum modes for analysis of standard metal shadowed specimens and for viewing of higher water content specimens. The SEM has a useful magnification range between 18-300,000x. The specimen chamber is a full 8in in diameter for containment of larger specimens.

JEOL JEM 3200FS Cryo-Transmission Electron Microscope
This intermediate voltage (300kV) transmission electron microscope uses a field emission electron gun providing both standard TEM and FE-SEM capabilities. The device includes an in-column energy filter and EDS detector for spatial mapping of elements within specimens. The cryogenic stage and tilting specimen holders were acquired for cryo-tomography of thick specimens allowing reconstruction of protein and viral structures. The main image detector is a Gatan 4kx4k Ultrascan 4000 CCD camera for capturing extremely high-resolution images with 16-bit data resolution over a wide linear signal range.

Imaging Research Facility (IRF):

Siemens 3 Tesla TIM Trio MRI scanner with state-of-the-art magnetic gradient system (maximum magnitude of 200 T/m, and slew rate of 45 T/m/s). The high performance gradient system generates less scanning noise and image artifacts. Besides the standard RF headcoils (CP headcoil and 12 channel headcoil), the scanner is equipped with a 32-channel head coil, allowing for imaging with much higher signal-to-noise ratio, spatial resolution and the option to speed up data acquisition. The 3T MRI scanner has the capability to perform studies on structure, function and chemistry in living tissues in human and animal subjects. It is used primarily for brain imaging, but is a total body imaging system.

Applied Science Laboratories Long Range Optic MRI-safe eye tracking system which is used to track eye movements in the MRI scanner.

Kappametrics MRI-safe 21 channel EEG system, consisting of sensor caps, EEG amplifiers and PC based computer for data acquisition and analysis. This equipment makes simultaneous acquisition of fMRI/EEG signal available.

In-house constructed Mock MRI scanner which simulates real MRI scanner for acclimation of subjects prior to studies. The mock scanner matches the real MRI scanner in all aspects except that there is no magnetic field. It creates an ideal environment for the subjects to become familiar with MRI scanner and activation tasks prior to the real scanning session.

EGI high-density (256 channel) EEG system (non-MRI compatible), which includes sensor cap arrays, data acquisition and analysis (MAC based) computing systems, and an 11 camera photogrammetry system for localization of recording sensors in 3D space.

SmartEye infrared dual eye tracking system (PC based) designed to interface to EGI EEG system. Allows measurement of eye position and pupil dilation.

Magstim Rapid transcranial magnetic stimulator with Brainsight MRI-guided infrared frameless stereotaxic control system, and 2 Figure-of-8 stimulation coils designed to perform non-invasive brain stimulation studies.

Computerized stimulus delivery and response collection systems which allow visual, auditory and tactile stimulation to be performed within the MRI/Mock scanner and in the EEG/TMS laboratory (including fiberoptic MRI-compatible response boxes).

PC and MAC data analysis workstations (total of 8) for processing fMRI, EEG and TMS data and integrating data across these methods.

Optometric Imaging

The Adaptive Optics Optical Coherence Tomography Scanner has been developed as part of a multi-center Bioengineering partnership between Indiana University, Lawrence Livermore National Lab, University of California Davis, Duke University, as well as the National Science Foundation's Center for Adaptive Optics. The Indiana University AOOCT scanner is capable of scanning at a resolution of 3x3x3 microns for volumetric imaging in the living human eye. This system is also capable of polarization sensitive imaging.

The Adaptive Optics Flood Illuminated Camera is a high resolution, non-coherence camera for studying the function of the normal human retina. This system is capable of multi-wavelength retinal imaging and provides stable measurements for time resolved processes of cell renewal and change.

The Adaptive Optics Scanning Confocal Imaging system has been developed as an NIH funded Bioengineering partnership which includes not only Indiana University, but the University of Rochester, University of California Berkeley, University of Montana, and Physical Sciences, Inc. The system is capable of generating 3 micron resolution images of the human retina over a 4 mm region of the human retina at a rate of 20 million pixels per second, providing high resolution structural and functional estimates of the human retina. This system is being used to further develop automated montaging systems and as a platform for new developments in high speed retinal imaging.

The Compact Adaptive Optics Scanning Laser Ophthalmoscope is a real-time imaging technology using high stroke MEMS mirror technology under development by Boston Micromachines, Inc. This new system, designed for deployment to multiple clinics, is the result of a Phase II development collaboration between Boston Micromachines and Indiana University.

High Speed Tear film imaging system has been developed to study the rapid changes in the tear-film of the eye. This system can be used to understand how different strategies for correcting the focus of the eye (such as contact lenses and surgery) impact the comfort and vision of observers.

The COAS High resolution Optical Aberrometer is used to study the detailed optical properties of the eye, and how they are affected by refractive interventions. This cutting edge, high resolution system is a collaboration between Indiana University and AMO Wavefront Sciences.

The Retinal Function mapping system (Veris) is available for electrical mapping of the retinal response. This system is used to map out functional changes to the retina in glaucoma and retina degenerations at both short and long time scales.

The Laser Scanning Digital Camera is a device designed to bring low cost confocal imaging for the underserved population. This imaging system can obtain moderate resolution confocal images of the entire posterior pole of the eye without requiring eye drops and is being used both for investigations of diabetic retinopathy and as a platform technology for new methods in fluorescence imaging and microscopy, as well as for retinal imaging.

The Ophthalmic Imaging suite is a set of imaging technologies that are available with the Borish Center for Ophthalmic Imaging for use via contracts and partnerships. This includes Topcon 2000 Imaging system, a Heidelberg Spectralis coherent imaging system, IOL master optical biometry, systems for corneal topography measurements, and a COAS clinical aberrometer.

The Multi-wavelength Scanning Confocal Imaging system is a confocal microscope optimized for retinal imaging at wavelengths ranging from the 480 nm to 1000 nm. It is highly configurable and can be used to measure photopigments, as well as to make fluorescein an ICG studies of the human retina in vivo.

The Scientific Computing Core is an new, NIH supported, core module for aiding individuals in extracting information from multi-dimensional datasets. The core will be designing algorithms for information extraction and disseminating the information through code sharing.

IU School of Medicine:

Small Animal Imaging Systems

EVS-R9 microCT. The EVS-R9 microCT scanner (Enhanced Vision Systems Corp, London, Ontario N6G 4X8) operates at 50 kVp and 1 mA maximum tube current. It is capable of 50 micron or 100 micron voxel resolution with 2x2 or 4x4 binning in the detector panel. The radiation dose associated with various imaging parameters (exposure time and angular samplings) is measured to obtain a guideline on imaging protocol designing. For each radiation dose level, image noise is also measured by the standard deviation of CT number in the water region. The noise to dose relationship is established for various detectorbinning modes.

IndyPET II. The IndyPET-II scanner has been developed at Indiana University by Dr. Hutchins as a high resolution, high sensitivity research PET scanner for use in small animal imaging studies. The system consists of four, approximately planar detector banks mounted on a rotating gantry. The detectors cover a transaxial FOV of 23cm and an axial FOV of 15 cm. This configuration reduces parallax distortions and produces a relatively uniform resolution throughout the FOV. The two pairs of opposing detectors banks are offset to give increased sampling density and increased spatial resolution. The average (radial and transverse) FWHM resolution is 2.5mm at the center of the FOV and increases to less than 3.5mm at the edge of the FOV. The NEMA-2001 sensitivity is 9030 cps/MBq at the center of the scanner and 4250 cps/MBq at a radius of 10cm. The NEMA-1994 sensitivity is 23.0 cps/MBq/ml.

IndyPET III. The IndyPET III scanner was developed at Indiana University by Dr. Hutchins The system was designed to achieve 1 uL volumetric spatial resolution suitable for whole body mouse imaging. The scanner uses 8 planar detector banks consisting of 48/spl times/108 array of 20 mm long LSO crystals with an array pitch of 0.87 mm coupled to two Hamamatsu H8500 large area, 64-anode photomultiplier tubes. The detector modules are mounted on a rotatable gantry offset from the center of rotation to allow increased sampling density. Transaxial resolution is 1.1 mm FWHM with an axial resolution of 1.5 mm FWHM. Sensitivity has been measured to be 4.0% of all decays. The scanner design allows for the

addition of 14 additional detector banks for improved resolution and sensitivity.

Varian 9.4T MRI Horizontal Bore. The Varian 9.4 T / 31 cm actively shielded horizontal bore MR system is suitable for in vivo imaging and sprectroscopy investigations of small animals ranging from mice to rabbits. The system is equipped with two sets of actively shielded gradient sets: 1) a 21 cm inner diameter gradient set capable of generating 20 G/cm, and 2) a 12 cm inner diameter gradient set capable of generating 40 G/cm. The state-of-the-art Varian Unity Inova console on the system is capable of performing multinuclear investigations and has waveform generators on all RF and gradient channels, which allow arbitrary pulse shaping and easy implementation of sophisticated imaging and spectroscopy pulse sequences. A number of single-tuned quadrature and dual-tuned linear imaging coils, slotted tube resonators and surface coils are available for multinuclear MR studies. MR methods, which are used for a variety of applications, include echo-planar imaging, diffusion weighted imaging, back-plane reconstruction, single voxel localized spectroscopy, chemical-shift imaging, gradient-enhanced spectral editing, multiple-quantum techniques and other specialty pulse sequences.

Berthold LB981 NightOwl . The NightOWL system consists of a Peltier cooled CCD camera (578 x 385 pixels) housed within a 102x60x40 cm light tight enclosure for imaging luciferase and GFP expression in small animals. The system is interfaced to a Pentium 200 MHz for data acquisition and analysis.

Interventional Radiology Research Laboratory. This laboratory is focused on research in atherosclerosis, restenosis, and directed drug delivery for the treatment of the cancer and vascular disease. The laboratory includes an animal operating room for microsurgeries as well as intraabdominal and intrathoracic surgeries, two Toshiba X-ray machines with fluoroscopic and DSA imaging capabilities, and associated ancillary equipment for subject monitoring and support.

Human Imaging Systems

Siemens MAGNETOM Trio 3T Unlimited MRI. The Trio 3T MRI, located in the R2 building, is a 3 tesla whole body imaging system operating with Syngo software. The system is equipped with a 200 T/m/s gradient system and 8 RF-channels. The flexible RF system has the capability of performing multinuclear and spectroscopy studies.

GE Signa Advantage 1.5T MRI. A dedicated research MRI system is located in the high technology imaging center of University Hospital. This system is a 1.5 tesla General Electric Signa Advantage system operating under software version 9.0. The system currently has the capability to perform hydrogen magnetic resonance spectroscopy and functional brain imaging studies using Echospeed. Two additional 1.5T General Electric MRI systems (1 each in University and Riley hospitals) have echo-planar imaging capabilities and are available on a limited basis for research studies.

Siemens ECAT HR+ PET. The Siemens ECAT HR+ PET scanner is located in the R2 building. The whole body imaging system has an axial field-of-view of 15 cm, is equipped with BGO detector technology and has retractable septa for 3-D volumetric imaging. Both conventional filtered backprojection and OSEM reconstruction algorithms are available and used routinely.

Siemens Biograph PET/CT. The Biograph PET/CT scanner is located in the Clinical building located in the IUPUI campus and is scheduled to be relocated to the R2 building. This system is a whole-body static imaging system equipped with BGO detector technology and capable of 3-D volumetric imaging. The axial field-of-view is 15 cm. Both conventional filtered backprojection and OSEM reconstruction algorithms are available and used routinely.

Alternative Animal Imaging Systems

Optosonics Thermoacoustic Tomography System. This new imaging modality, conceived and developed at Optosonics, Inc (Indianapolis, IN) in collaboration with the Indiana-CEBI, produces images of tissue RF absorption contrast by detecting sonic waves produced by thermal expansion of tissue. A small animal system has been constructed using a tunable laser enabling optical absorption spectroscopy and imaging. The current system has a spatial resolution of 200 microns and can image using optical wavelengths in 532-1064nm wavelength range using an Optotek, Inc laser.

Radionuclide Production Systems

RDS-Eclipse Cyclotron: Housed within the BRTC building is a Siemens RDS-Eclipse cyclotron. This system consists of an 11 MeV proton cyclotron, target systems for the production of 11C, 18F,13N and 15O used in the synthesis of PET tracers.

IIBIS Imaging Services Core

The IIBIS provides a range of services that include education of investigators on the capabilities and application of imaging technologies, consultation to assist with imaging study design, production of PET tracers, performance of imaging studies, resources for image processing and data analysis, and quality control for all chemistry and imaging systems housed within the R2 and BRTC facilities. A brief description of the core services follows:

PET Tracer Production: PET Carbon-11, Nitrogen-13, Oxygen-15 and Fluorine-18 tracers are produced for PET imaging studies. Numerous tracers are in various stages of development for support of cancer, cardiovascular and neuroscience research.

PET Research & Routine Production Radiotracers

1. Heart acetylcholinesterase imaging agents (dog and rat heart imaging):Cardiac acetylcholinesterase imaging agents [11C]edrophonium, [11C]pyridostigmine
2. Choline kinase imaging agent (tumor mice): [11C]Choline
3. MMP (Matrix metalloproteinase) imaging agents (tumor mice): [C-11]Me-CGS 27023A and its analogs, [C-11]Me-halo-CGS 27023A analogs, [C-11]Biphenylsulfonamide analogs
4. Alkylguanine-DNA alkyltransferase (AGT) imaging agents (tumor mice): Radiolabeled O6-benzylguanine analogs
5. Herpes simplex virus thymidine kinase (HSV-TK) reporter probes (tumor mice): [18F]FHBG and other fluorine-18 labeled penciclovir and ganciclovir analogs
6. Brain dopamine and serotonin transporters ligands (human, pig and rat brain imaging): [11C]β-CFT, [11C]β-CIT, [11C]β-CNT for the study of Parkinson's Disease.
7. Muscarinic Receptor Ligands (dog heart imaging): [C-11]Methyl-QNB, [C-11]Methyl-TRB
8. Peripheral Benzodiazepine Receptor Ligand (tumor mice and rat): [11C]DAA1106
9. D2/D3 receptor ligand (human and rat brain imaging): [11C]Raclopride
10. β-Amyloid Plaques Ligand for Alzheimer's Disease (human brain imaging): [11C]PIB
11. Vesicular monoamine transporter ligand (rat brain imaging): [11C]DTBZ
12. Sympathetic Nervous System (human and dog heart imaging) : [11C]HED
13. High-affinity choline uptake (HACU) ligands (rats and mice, tumor and heart imaging): [11C]HC-15 and [11C]HC-3
14. SKCa channels ligand (rat heart imaging): [11C]NML
15. Vagal Nervous System (dog heart imaging): [11C]Neostigmine
16. Luciferase reporter probes (tumor mice): [C-11]D-luciferin methyl ester and [C-11]D-luciferin methyl ether
17. Blood Flow (human and dog): [O-15]Water, [N-13] Ammonia
18. Glucose Metabolism (human and animal): [F-18]FDG
19. Blood Volume (tumor mice): [C-11]CO

20. Free Fatty Oxidation Rates (human and animal): [C-11]Acetate

Performance of Imaging Studies: The imaging center provides experienced and trained technologists for the acquisition and basic image processing required for all studies. Investigators, or their staff, work closely with the imaging center technologists in the performance of specific studies. The imaging center staff administer anesthesia to the animals, administer PET tracers or contrast agents, and operate the imaging systems. The only exception to this model is for bioluminescence/biofluorescence imaging where investigators can operate the system without support once trained. The imaging center staff is also responsible for all necessary image reconstruction or processing needed for the study. An emphasis for all imaging studies is placed on the collection of data that permits quantitative or semi-quantitative analysis of results.

Image Processing and Data Analysis: The imaging center maintains numerous servers and software packages for the analysis of imaging data. A large base of in-house developed imaging processing software (based upon IDL and/or MATLAB) is maintained by the faculty and staff in the imaging center. This software enables the generation of multimodality fusion images, navigation throughout image volumes in standard and non-standard image planes, definition of region-of-interests, application of semiquantitative data analysis methods (SUVs), application of quantitative data analysis methods (compartmental models), and 3-D visualization tools (projections, maximum intensity projections) for subjective evaluation of image data. Tools for the registration of multimodality images have been developed and validated in our laboratory and are utilized routinely so that fused data sets can be easily generated. Access to all software and servers is made available to interested cancer center investigators using X-window emulators and VPN clients. A limited number of image processing workstations are also available in the imaging processing laboratory housed in the imaging center.

Confocal Microscope Systems

An **Olympus FV1000-MPE Confocal/Multiphoton Microscope** equipped with an Argon laser (458, 488, 515 nm excitation lines), and three diode lasers (405, 559, and 635 nm excitation lines) for confocal microscopy and a Spectra Physics MaiTai Deep See laser (tunable from 710 to 990 nm) with dispersion compensation for multiphoton microscopy. The confocal system is configured for three channels of fluorescence detection plus one channel for transmitted light detection. Channels one and two are spectral detectors with user-specified min and max wavelengths for the emission bandpass. The system is also equipped with two external detectors for multiphoton imaging, with dichroic mirrors available for collection of either blue and green or green and red emission. The system is mounted on an Olympus IX81 inverted microscope stand.

A **Bio-Rad MRC1024 Confocal/Multiphoton Microscope** is equipped with a Krypton-Argon (488, 568, 647 nm excitations) laser for confocal microscopy and a tunable Titanium-Sapphire laser (using a 5W Millennia diode solid state pump laser) for multiphoton microscopy. The system is equipped with 3 detectors in both the epi-illumination and transillumination paths, as well as three channel external detectors for 2-photon imaging. The system supports confocal imaging of green, red and far-red emitting fluorophores and multi-photon imaging of blue, green and red emitting fluorophores. The system can also be used to collect bright field and Nomarski images. The system is mounted on a Nikon TE-200 inverted microscope.

A Zeiss **LSM-510 Meta Confocal/Multiphoton Microscope** equipped with an Argon laser (458, 488, 514nm excitation) and two Helium-Neon Lasers (543 NM and 633 NM excitation) for confocal microscopy, and a tunable Titanium-Sapphire laser (using a 10W Millennia diode solid state pump laser) for multiphoton microscopy. The epifluorescence can be captured via two conventional PMT detectors or via the new Meta system. The Meta system is an array of 32 detectors, which permits collection of the total emission spectrum from a fluorescent sample. This system allows users to configure the system to collect specific emission ranges or, when combined with the linear unmixing software, to deconvolve sample emissions to allow sensitive discrimination of a large number of spectrally overlapping flourophore Multiphoton microscopy images can be collected either via these detectors or two external detectors. This system supports confocal imaging of green, red and far-red emitting fluorophores by

confocal microscopy, and multi-photon imaging of blue, green and red emitting fluorophores. The system is mounted on a Zeiss upright microscope.
A Zeiss **UV LSM-510 Confocal Microscope** equipped with a UV Argon Laser (351 NM, 364 NM excitation), a visible Argon laser (458, 488nm excitation) and two Helium-Neon Lasers (543 NM and 633 NM excitation). The microscope is equipped with four epifluorescence detectors and one transillumination detector. This system supports confocal imaging of blue, green, red and far-red emitting fluorophores and can also be used to collect bright-field or Nomarski images. The system is mounted on a Zeiss Axiovert 100 inverted microscope.
A **Spinning Disk Confocal Microscope** equipped with 3 lasers providing excitations at 442 NM, 488nm, 514 NM, 568 NM and 647 NM This system utilizes a unique spinning disk that simultaneously scans hundreds of spots over a sample, simultaneously collecting images with an Ixon air cooled EMCCD camera (Andor). This design allows the system to collect images at over 30 frames per second with very low levels of illumination. The reduced photobleaching and phototoxicity of this system makes it especially suited to live cell imaging. This system is configured to rapidly collect images of cells expressing CFP and YFP, or labeled with green, red and far-red emitting fluorophores. It can also collect bright-field and phase contrast images. The system mounted on a Nikon TE-2000U inverted microscope.

Widefield Microscope Systems

A **Nikon Eclipse TE200 Inverted Microscope** equipped with a **Hamamatsu 1394 Orca-ER Cooled CCD Camera** and Micro-Manager software. The highly sensitive Hamamatsu Orca-ER camera is ideal for detection of fluorescence in live samples and in samples that have low signal levels. This high performance widefield microscope system is also equipped with Differential Interference Contrast optics (DIC). The inverted microscope stand accomodates slides or culture dishes. Best results are obtained using thin samples, such as well spread single cells. The system is equipped to collect images of blue, green, red and far-red emitting fluorophores.
A **Nikon Diaphot 200 Inverted Microscope** equipped with a **Diagnostic Instruments SPOT color camera**. The limited sensitivity of this system makes it inappropriate for epifluorescence of anything but very bright probes, but the system is optimized for high-resolution Nomarski, DIC and phase contrast imaging. An Eppendorf micromanipulator and microinjector is available to mount on the stage of the microscope making it particularly useful for imaging living cells over time.
A **Nikon Microphot SA Upright Microscope** equipped with a sensitive **Diagnostic Instruments SPOT RT Slider color camera** capable of capturing moderately low-light level images of blue, green and red emitting fluorophores. This system is very simple to use, and in addition to providing excellent epifluorescence images, is capable of collecting color, bright field and phase contrast images.

Auxiliary Equipment available for use with scopes:

(3) Warner DH-35 dish warmers, a PMDI Open Perfusion Micro-incubator, a Warner RC-50 Transepithelial imaging chamber, and(2) Warner OW objective warmers.

Computer Systems

In addition to the scope systems, the facility has a 5.4 terabyte IBM Fileserver and two public workstations. Web and remote file services are available via a failover linux cluster. Interactive 3D (voxel-based) image processing is performed using PCs equipped with 3.2 GHz Xeon processors, FireGL and Radeon-based video boards, and 6 to 8GB of memory. Various other image-oriented programs are also run on the PCs, including Media Cybernetics' AutoDeblur for deconvolution, Universal Imaging's Metamorph for image analysis/processing, NIH's ImageJ, Amira, Adobe Illustrator and Photoshop for image editing, and Premiere for making movies.

Publication-quality images and graphics can be generated on a Kodak 8670 PS dye sublimation photo printer, Xerox Phaser 7300 color laser printer, and an Epson Photo 2200. Most PCs are equipped with CD burners and some offer DVD-R/RW recorders. Core microscopy systems and workstations are connected by gigabit ethernet.

Purdue University

Electron Microscopy

FEI Titan 80-300kV Field Emission Environmental Scanning/Transmission Electron Microscrope - enables EM level imaging under variable vacuum conditions. Environmental chambers provide for in situ materials processing with a resolution of 1Å and various imaging modalities with a high performance camera and data handling system.

FEI Titan Krios TEM (FEG) – A state of the art transmission electron microscope capable of atomic resolution. This instrument is the most advanced electron microscope currently available. It has accessories to permit examination of frozen hydrated samples, a Gatan Tridiem energy filter to improve electron tomograms and an automatic loading device, eliminating the need for a technician to be present during each sample change. With optimized performance throughout the 80 to 300kV range and a Gatan 4K CCD camera, this instrument is highly versatile and designed for high throughput studies and can be remotely operated. (Expected installation date, November, 2009)

FEI Cryo-Electron Microscope CM300 (FEG) - A dedicated 300kV instrument with a Schottky field emission source permitting ultra-high brightness, low energy spread and high coherence, this instrument is capable of achieving high resolution images on the thickest of EM specimens. The high accelerating voltage combined with high-tilt Gatan cryo-holders and the 4K Tietz CCD Camera and software allow for automated collection of tomograms. A secondary 1K high-speed Tietz CCD gives real time imaging/feedback to the operator.

FEI Cryo-Electron Microscope CM200F (FEG) - A system similar to the CM300 except operating at 200kV and equipped with Gatan 4K CCD camera and imaging software.

All instruments are computer interfaced and under service contract to limit down time. The Biological Electron Microscopy Facility, where these instruments are located, is also furnished with all the ancillary equipment required to prepare samples for cryo-electron microscopy or cryo-electron tomography. This includes several high resolution scanners, an FEI Vitrobot, two carbon evaporators and two Gatan dry pumping stations. An older FEI EM420 TEM (120 kV) is also available for screening of samples and training purposes.

Light Microscopic Systems

Bio-Rad Radiance 2100 multiphoton microscope purchased in 2003. This instrument has a 10 Watt Mai-Tai femtosecond laser as well as 488, 532 and 633nm lasers. There are 3 internal detectors and 2 external high-speed detectors that also have the Becker and Hickl lifetime module. The inverted Nikon microscope is also equipped with an environmental chamber for small cell culture systems and is shielded to reduce light contamination of data.
An **Olympus total internal fluorescence microscope (TIRFM)** system built upon an IX71 inverted microscope equipped for TIRFM, wide-field fluorescence, phase-constrast and DIC. Laser illumination from three separate lasers (488 nm Argon laser, green He-Ne laser (543 nm) and red He-Ne laser (633 nm) is ported into the microscope through the Olympus TIRFM module. Image capture is via a 512 X 512 Hamamatsu EM back-thinned CCD camera controlled with Scanalytics IP Labs software.
The integrated **Picoquant Microtime 200 system** provides for single molecule tracking by fluorescence correlation spectroscopy (FCS) and also includes high-end capabilities for fluorescence lifetime imaging microscopy (FLIM) and Förster resonance energy transfer (FRET). FCS measures the thermodynamic fluctuations of diffusing molecules in a confocal detection geometry (600-800nm) and facilitates the monitoring of molecular noise (brightness) over a large dynamic range (GHz to Hz) covering photophysics, conformational transitions, diffusion rates, single molecule binding kinetics, transport properties of labeled biomolecules, and on/off rates. Detection volume used is thus very small (~1 femtoliter) and the concentration range spans ~100nM

to 10pM, thus enabling diffusion and interaction studies of single molecules (5-10nm) at picoMolar concentration.
Bruker Senterra Raman confocal microscope systems with 6-wavelength capability. This range of capability enables optimal signal-to-noise ratios and expands the range of samples that may be assessed with this technology, which provides both images and spectra from biological samples.
iCys laser scanning cytometer from Compucyte is a high speed, microtiter plate-compatible and high resolution light microscopy system can provide critical linkage between phenotype and genotype. This laser scanning cytometer provides subsecond confocal automated imaging from light and dark field microscopy.
Veeco Bioscope II wet surface compatible Atomic Force Microscope (AFM) with environmental control stage. The system integrates AFM with an Olympus inverted BX17 optical systems and software that associates AFM and microscopic information. The system accommodates standard and customized AFM tips for structural and functional analyses.
AutoPix Laser Capture Microdissection (Arcturus) To specifically isolate cells from tissues most pertinent to a disease category or experimental question. The instrument combines automated upright microscope architecture, three-dimensional optical control of the dissecting laser beam and the dissected area, non-contact tissue sampling and motorized post-dissection handling.
Cyntellect Laser Enabled Analysis and Processing (LEAP) instrument platform enables both specific cell ablation and very high efficiency transformation. A Q-switched, diode-pumped, solid-state, Nd:YAG laser is coupled with a novel fluorescence imaging system. The average power output of this laser at 532nm is about 50mW. It pulses at a 1kHz frequency with a pulse width of 0.75ns, and peak power output of above 50kW at 532nm. The instrument was designed with an achromatic F-theta lens that, when combined with high-speed galvanometer mirrors, allows for large surface area imaging with an intensified CCD cameras. Custom software is used to direct the laser beam pulses at targets that can be user-selected or auto-selected by the custom software. The pulsed laser can be used to either eliminate cells for sorting or to laser-opto-inject genes and other molecules into live single cells with cell viabilities greater than 95 percent.
Spinning Disk (Yokogawa) **Confocal Microscope** attached to a Nikon T200 stand. Excitation is provided by a Coherent Innova 70c mixed gas laser with an acoustic-optical tuned filter. It is capable of providing lines at 488, 514, 568 and 647 nm. This platform must be upgraded for high speed and time-lapse molecular imaging.

Custom systems

Mulitmodal Nonlinear Optical Microscope has been developed that provides integration of coherent anti-Stokes Raman Scattering (CARS), two-photon fluorescence (TPF), second harmonic generation, and third harmonic generation imaging modalities on a single optical platform. This system enables ready integration of labeled and label-free microscopic imaging and the outstanding resolution of non-linear imaging.

BARDOT is a novel system designed to image and automatically classify pathogenic bacteria. The simple diode laser based system uses light scattering and a powerful software package to detect and identify bacterial colonies on a standard Petri dish culture support.

Mulitvariate Hyper-Spectral Imaging Instrument employs a high resolution spatial light modulator to detect full spectral responses with a high sensitivity single channel photomultiplier tube. This NSF-funded system enables either direct imaging of cells and cellular components or reconstruction of complete high resolution spectral images to provide chemical information (a 'chemical' microscope).

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM A-1: **Master of Arts in Applied Anthropology To Be Offered by Indiana University at Its IUPUI Campus**

Staff Recommendation

That the Commission for Higher Education approve the Master of Arts (M.A.) in Applied Anthropology to be offered by Indiana University at its IUPUI Campus, in accordance with the background discussion in this agenda item and the *Abstract*, August 28, 2009; and

That the Commission recommend no new state funds, in accordance with the supporting document, *New Academic Degree Program Proposal Summary*, August 28, 2009.

Background

Indiana University currently offers a B.A. in Anthropology at its IUPUI campus. In FY2008, this program enrolled 136 headcount or 90 FTE students and had 22 graduates.

The field of Applied Anthropology focuses on cross-cultural engagement with real world issues, especially those facing or with ties to the local community. So, for example, departmental faculty have engaged in a number of research efforts, such as the Ransom Place project, a cross-cultural longitudinal assessment of fetal alcohol spectrum disorders, and studies of visitors to local museums. The proposed program would also take advantage of international partnerships, such as the one between IUPUI and Moi University in Kenya. A total of 34 U.S. universities currently offer graduate degrees in Applied Anthropology. This would be the first such offering in Indiana's public sector.

Students attending IUPUI would also have the opportunity of participating in a combined five year B.A./M.A. Qualified students could count up to 16 semester hours of credit taken during their junior and senior years toward both the B.A. in Anthropology and the M.A. in Applied Anthropology programs. Approval of the proposed program would put in place the first five-year combined B.A./M.A. on the IUPUI campus. The proposed program has been developed as a terminal degree, i.e. most students would seek work upon graduation rather than using the master's program as a step toward a doctoral degree.

Supporting Documents

(1) *Abstract* – Master of Arts in Applied Anthropology To Be Offered by Indiana University at Its IUPUI Campus, August 28, 2009

(2) *New Academic Degree Program Proposal Summary* – M.A. in Applied Anthropology, August 28, 2009

Abstract

Master of Arts in Applied Anthropology
To Be Offered by
Indiana University at Its IUPUI Campus

August 28, 2009

Objectives: To take advantage of the department's strengths in Public Archaeology, Urban Anthropology and Social Policy, International Development, Globalization, Medical Anthropology, and Museum Studies to produce students who may choose to follow a targeted curriculum which will allow them to focus on a particular aspect of the discipline, but who will also be well-trained in a broad range of anthropological theories and methods.

Clientele to be Served: Students who hold a minimum of a Bachelor's degree from and accredited institution, with a GPA of at least 3.0 (on a scale of 4.0). Students who demonstrate other strengths and good preparation for the program may be accepted at the discretion of the Anthropology Department Graduate Committee and with the approval of the graduate school.

Curriculum: A total of 36 semester credit hours are required to complete the program, distributed as follows:

Core Courses (6 credit hours)
- Fundamentals of Applied Anthropology (3)
- Anthropological Thought (3)

Methods Course within Chosen Sub-discipline (3 credit hours)
Field Methods Ethnography (3) **or**
Theory and Methods in Biological Anthropology (3) **or**
Archaeological Method and Theory (3)

Electives (21 credit hours)

Internship or Thesis (6 credit hours)

Employment Possibilities: Potential employers are not-for-profit institutions and agencies where the kind of training in a range of skills, including ethnographic research methods, quantitative analysis, archaeological field methods and osteology are in demand. Hospitals, social service agencies, and health clinics would be potential employers for individuals with graduate training in Biological Anthropology. Other potential employers include city planning and community development agencies, historical societies, state archaeologist offices and private contractors.

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

August 28, 2009

I. Prepared by Institution

Institution/Location: Indiana University to be offered at its IUPUI campus
Program: M.A. in Applied Anthropology

	Year 1 FY2010	Year 2 FY2011	Year 3 FY2012	Year 4 FY2013	Year 5 FY2014
Enrollment Projections (Headcount)					
Full-Time	3	4	4	4	4
Part-Time	5	10	15	15	15
Total	8	14	19	19	19
Enrollment Projections (FTE)					
Full-Time	2	3	3	3	3
Part-Time	3	5	8	8	8
Total	5	8	11	11	11
Degree Completions Projection	2	3	8	8	8
New State Funds Requested (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds Requested (Increases) *	-0-	-0-	-0-	-0-	-0-

II. Prepared by CHE

New State Funds To Be Considered For Recommendation (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds To Be Considered For Recommendation (Increases) *	-0-	-0-	-0-	-0-	-0-

CHE Code: 09-23
Campus Code: 1813
County: Marion
Degree Level: 07
CIP Code: Federal – 450201; State – 450201

* Excludes new state dollars that may be provided through enrollment change funding.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM A-2: **Master of Business Administration To Be Offered by Indiana State University at the Indianapolis Aviation Technology Center**

Staff Recommendation

That the Commission for Higher Education approve the Master of Business Administration to be offered by Indiana State University at the Indianapolis Aviation Technology Center, in accordance with the background discussion in this agenda item and the *Abstract*, August 28, 2009; and

That the Commission recommend no new state funds, in accordance with the supporting document, *New Academic Degree Program Proposal Summary*, August 28, 2009.

Background

Indiana State University currently offers a Master of Business Administration (MBA) on its Terre Haute campus. This program is relatively small and has experienced a decline in enrollments between FY2004-FY2008: headcount enrollment went down from 87 to 69, while FTE enrollment went from 53 to 44. The MBA program graduated 16 students in FY2008, although an annual average of 32.5 students graduated in the four years prior to that. With new leadership in the College of Business, the University believes Hoosier enrollments in the Terre Haute-based MBA will soon rise (international students comprise about one-half of the current enrollment).

The market to be served by the proposed program is Hendricks County and the western part of Marion County. Classrooms at the Aviation Technology Center (ATC) at Indianapolis International Airport will be used to deliver the program. Had there not been space available at the ATC, the University would have found alternative space in the western Indianapolis metropolitan area. Classes will be taught almost exclusively by tenured or tenure-track full-time faculty based in Terre Haute.

Indiana State has indicated that the MBA is the only graduate program that the University could have easily offered in the Indianapolis region.

Supporting Documents

(1) *Abstract* – Master of Business Administration To Be Offered by Indiana State University at the Indianapolis Aviation Technology Center, August 28, 2009.

(2) *New Academic Degree Program Proposal Summary* – MBA, August 28, 2009.

Abstract

Master of Business Administration
To Be Offered by
Indiana State University at the
Indianapolis Aviation Technology Center

August 28, 2009

Objectives: To offer a ten-week, compacted term Professional Master of Business Administration (MBA) at an off-campus site

Clientele to be Served: Students who have five or more years of professional experience.

Curriculum: A minimum of 33-36 semester credit hours are required to complete the program, distributed as follows:

Introductory Course (3 credit hours)
- Advance Management Practices

Core Courses (12 credit hours)
- Managing the Strategic Workforce (3)
- Strategic Financial Decisions (3)
- Strategic Supply Chain and Operating Decisions (3)
- Strategic Marketing Management (3)

Business Tools (9 credit hours)
- Quantitative Problem Solving (3)
- Management Accounting (3)
- Management Information Systems (3)

Culminating Experience (3 credit hours)
- Dynamic Strategy: An Integrated Approach (3)

Electives (15 credit hours)
- Non-Concentration Option (two courses; 6) **or**
- Concentration Option (three courses; 9)

Employment Possibilities: Graduates can expect to obtain general and operational manager positions in a variety of occupational fields.

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

August 28, 2009

I. Prepared by Institution

Institution/Location: Indiana State University to be offered at the Indianapolis Aviation Technology Center
Program: MBA

	Year 1 FY2010	Year 2 FY2011	Year 3 FY2012	Year 4 FY2013	Year 5 FY2014
Enrollment Projections (Headcount)					
Full-Time	0	0	0	0	0
Part-Time	27	49	49	49	49
Total	27	49	49	49	49
Enrollment Projections (FTE)					
Full-Time	0	0	0	0	0
Part-Time	18	33	33	33	33
Total	18	33	33	33	33
Degree Completions Projection	0	22	22	22	22
New State Funds Requested (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds Requested (Increases) *	-0-	-0-	-0-	-0-	-0-

II. Prepared by CHE

New State Funds To Be Considered For Recommendation (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds To Be Considered For Recommendation (Increases) *	-0-	-0-	-0-	-0-	-0-

CHE Code: 09-19
Campus Code: 9563
County: Marion
Degree Level: 07
CIP Code: Federal – 520201; State – 520201

* Excludes new state dollars that may be provided through enrollment change funding.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM A-3: **Master of Liberal Studies To Be Offered by Indiana University Northwest at Gary**

Staff Recommendation

That the Commission for Higher Education approve the Master of Liberal Studies to be offered by Indiana University Northwest at Gary, in accordance with the background discussion in this agenda item and the *Abstract*, August 28, 2009; and

That the Commission recommend no new state funds, in accordance with the supporting document, *New Academic Degree Program Proposal Summary*, August 28, 2009.

Background

Indiana University currently offers the Master of Liberal Studies (M.L.S.) at four campuses (Kokomo, South Bend, Southeast, IPFW). USI also offers an M.A. in Liberal Studies. IU Kokomo is the most recent campus (August 2002) to receive authorization from the Commission for a program of this type. All other campuses received their authorizations in the 1980s and 1990s. Enrollment in the three more established IU M.L.S. programs tends to be small, ranging from 34-52 headcount and 14-15 FTE in FY2008. Between FY2004-FY2008, the five-year average of annual graduations has ranged between 4.2 and 10.4 for these three programs.

From a staff perspective, there are two key elements of the University's rationale for the program: the degree can be easily offered because it draws from existing courses and it will have significant economic outcomes for students. The first component of the rationale is readily sustained, since the curriculum is flexible in nature and can draw from a wide array of liberal arts courses. To test the second component, data were utilized from the Indiana Workforce Intelligence System (IWIS), which is a collaborative initiative of the Commission for Higher Education, the Department of Workforce Development, and the Department of Education.

IWIS data pertaining to the IU Southeast and IU South Bend M.L.S. programs were analyzed to see if the effect projected by the proposed program was in evidence for these two programs, which together had 121 graduates over the period FY1999-FY2008. These data were analyzed to see how many of the graduates remained in Indiana, remained with the same

employer, and had higher earnings after graduation. In all cases, employment and earnings data were examined for the quarter prior to graduation and the quarter after graduation.

Remained in Indiana. A total of 88 of the 121 graduates (73%) had post-graduation earnings in Indiana. Data for the most recent quarter (Q4 of 2008) on all graduates indicated that 64 of the 121 graduates (53%) were still employed in Indiana. It should be noted that the IWIS data does not include information on those who are self-employed or who are employed in a bordering state, although they still live in Indiana.

Remained with Same Employer. A total of 48 of the 103 students (47%) who graduated in the beginning of the second quarter of 2001, the earliest quarter for which employer data were available, were still with the same employer they had worked for prior to graduating.

Higher Earnings. For the 96 graduates (79%) with any Indiana earnings, the average increase in earnings for the quarter following graduation was $1,028.

The University concludes that the IWIS analysis generally supports the claims for the proposed program, which is premised on the assumption that graduates of the IU Northwest program will have employment experiences similar to those of IU Southeast and IU South Bend graduates.

Supporting Documents

(1) *Abstract* – Master of Liberal Studies to be offered by Indiana University Northwest at Gary, August 28, 2009

(2) *New Academic Degree Program Proposal Summary* – Master of Liberal Studies, August 28, 2009

Abstract

Master of Liberal Studies
To Be Offered by
Indiana University at Gary

August 28, 2009

Objectives: To provide students with a graduate level interdisciplinary experience, promoting the campus as a well-integrated learning community.

Clientele to be Served: Traditional and non-traditional graduate students. The primary recruitment base will include K-12 teachers, professionals, and individuals who wish to pursue a general education beyond a Bachelor's degree.

Curriculum: A total of 33 semester credit hours are required to complete the program, distributed as follows:

Core Courses (12 credit hours)
- Seminar on Research Methods in Arts and Humanities (3)
- Seminar on Research Methods in Sciences (3)
- Seminar on Research Methods in Social Sciences (3)
- Introduction to the Master of Liberal Studies (3)

Electives (15-21 credit hours)
- 21 hours of electives without thesis or
- 15-18 hours of electives with 3-6 hours of thesis research

Employment Possibilities: The proposed program is designed to help four groups of students reach their personal and educational goals. The first includes non-traditional students who wish to continue their education but without the specific professional aspirations assumed of more traditional degrees and programs. The second and third are K-12 educators and professionals who need additional credentials/education to maintain their certification or advance their careers. The fourth are non-traditional adult learners who wish to prepare for and to pursue post-graduate education but who need additional preparation and life experiences before applying to doctoral and professional school programs.

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

August 28, 2009

I. Prepared by Institution

Institution/Location: Indiana University Northwest to be offered at Gary
Program: Master of Liberal Studies

	Year 1 FY2010	Year 2 FY2011	Year 3 FY2012	Year 4 FY2013	Year 5 FY2014
Enrollment Projections (Headcount)					
Full-Time	0	0	0	0	0
Part-Time	5	10	15	15	15
Total	5	10	15	15	15
Enrollment Projections (FTE)					
Full-Time	0	0	0	0	0
Part-Time	3	5	7	7	7
Total	3	5	7	7	7
Degree Completions Projection	0	0	5	5	5
New State Funds Requested (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds Requested (Increases) *	-0-	-0-	-0-	-0-	-0-

II. Prepared by CHE

New State Funds To Be Considered For Recommendation (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds To Be Considered For Recommendation (Increases) *	-0-	-0-	-0-	-0-	-0-

CHE Code: 09-04
Campus Code: 1815
County: Lake
Degree Level: 07
CIP Code: Federal – 240101; State – 240101

* Excludes new state dollars that may be provided through enrollment change funding.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM A-4: **Technical Certificate and Associate of Applied Science in Manufacturing Production and Operations To Be Offered by Ivy Tech Community College of Indiana Statewide via Distance Education Technology**

Staff Recommendation

That the Commission for Higher Education approve the Technical Certificate (T.C.) and Associate of Applied Science (A.A.S.) in Manufacturing Production and Operations to be offered by Ivy Tech Community College of Indiana Statewide via Distance Education Technology, in accordance with the background discussion in this agenda item and the *Abstract*, August 28, 2009; and

That the Commission recommend no new state funds, in accordance with the supporting document, *New Academic Degree Program Proposal Summary*, August 28, 2009.

Background

Ivy Tech Community College currently offers, in all 14 regions, Technical Certificate and Associate of Applied Science programs in two areas related to manufacturing: Industrial Technology and Advanced Manufacturing. In Fall 2009, these programs enrolled a total of 3,045 headcount or 1,831 FTE students.

The Industrial Technology program is geared toward developing foundational skills for use in manufacturing environments with stable product lines. By contrast, the Advanced Manufacturing program prepares students to function in manufacturing environments characterized by implementation of quality systems, lean concepts, and production change requirements – all of which call for workers with advanced skill levels and the ability to work in team settings with production engineers. The proposed Manufacturing Production and Operations program occupies a middle ground between these two programs.

More specifically, the Manufacturing Production and Operations program is focused on preparing workers who set up and operate machines, especially those in computer-controlled networks, which allow operators to tend a number of machines simultaneously, and those that employ robots to load and unload parts from machines. There is some curricular overlap between the Industrial Technology and Advanced

Manufacturing programs. Seven of the 14 new courses required for the Manufacturing Production and Operations program can also count toward meeting the degree requirements of the Industrial Technology and Advanced Manufacturing programs. The other seven new courses have been developed to address the unique objectives of the Manufacturing Production and Operations program.

While manufacturing jobs will likely decline in Indiana, the manufacturing industry will continue to be important to the state's economy and those jobs that remain will require higher skill levels appropriate to more automated and higher productivity companies. The proposed program is intended to provide replacements for the many Baby Boomers in manufacturing positions, who are expected to retire over the next decade. Students who already have some experience working with machines, but need to upgrade their skills to stay competitive, will likely constitute the clientele for this program.

The College has proposed this new program only as a distance education option, and at this point the College has no plans to deliver the program in a traditional classroom setting. While this is unusual, it is not unprecedented and is consistent with the Commission's distance education policy. Another notable feature of the proposed program is the use of instructional material developed by an Indiana-based company, Oxygen, whose software will support delivery of most of the new courses. The partnership with Oxygen will enable the College to deliver all of the new coursework over the next two years, beginning in January 2010.

The associate degree program is proposed as an Associate of Applied Science program because its primary objective is workforce development, as opposed to transfer. There may be opportunities further down the line to develop transfer options for students pursuing an associate degree.

Supporting Documents

(1) *Abstract* – Technical Certificate and Associate of Applied Science in Manufacturing Production and Operations To Be Offered by Ivy Tech Community College of Indiana Statewide via Distance Education Technology, August 28, 2009.

(2) *New Academic Degree Program Proposal Summary* – T.C./A.A.S. in Manufacturing Production and Operations, August 28, 2009.

Abstract

Technical Certificate and Associate of Applied Science in
Manufacturing Production and Operations
To Be Offered by
Ivy Tech Community College of Indiana
Statewide via Distance Education Technology

August 28, 2009

Objectives: To address needs for skilled production operators who can function as fully proficient manufacturing system employees in manufacturing environments. Graduates will be skilled in gauging and inspection equipment, CNC machine operations, metrology, tooling, quality systems, inspection techniques, lean manufacturing, and automation.

Clientele to be Served: High school graduates wishing to continue their education, individuals wishing to re-enter the workforce with new skills, currently employed people wishing to continue or supplement their education for the purpose of career advancement and academic enrichment, and individuals already engaged in a manufacturing industry who are looking to upgrade their current position or move into new positions with their current employer or new employers.

Curriculum: A total of 31 semester credit hours are required to complete the Technical Certificate program (identified by an asterisk), and 61–64 semester credit hours are required to complete the Associate of Applied Science program, distributed as follows:

General Education (TC – 3-4 credit hours; AAS – 19-22 credit hours)
- Fundamentals of Public Speaking (3) **or**
- Introduction to Interpersonal Communication (3)

- English Composition (3)*
- Life Skills Elective (1)*
- Mathematics Elective
- Science Elective (3-4)
- Humanities/Social/Behavioral Science Elective (6-8)*

Professional/Technical Coursework (TC – 24 credit hours; AAS – 42 credit hours)
- Introduction to Plant Floor & CNC Principles (3)*
- Shop Mathematics (3)*
- Introduction to Print Reading (3)*
- Manufacturing Automation (3)*
- Introduction to Workplace and Safety (3)*
- CNC Operations (3)*
- Metrology (3)*
- Quality Control Concepts and Techniques I (3)*
- Lean Manufacturing (3)
- Production Technology (3)
- Manufacturing Metals (3)
- Production Machine Tooling (3)

- Geometric Dimensioning and Tolerancing (3)
- Advanced Lean Manufacturing (3)

Employment Possibilities: The program will prepare graduates for a number of operating, production , and first-line supervisory positions within manufacturing industries.

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY
August 28, 2009

I. Prepared by Institution

Institution/Location: Ivy Tech Community College of Indiana to be offered statewide via distance education technology
Program: T.C. in Manufacturing Production and Operations

	Year 1 FY2010	Year 2 FY2011	Year 3 FY2012	Year 4 FY2013	Year 5 FY2014
Enrollment Projections (Headcount)					
Full-Time	20	32	39	41	41
Part-Time	55	88	106	112	112
Total	75	120	145	153	153
Enrollment Projections (FTE)					
Full-Time	20	32	39	41	41
Part-Time	28	41	50	53	53
Total	48	73	89	94	94
Degree Completions Projection	0	2	18	24	36
New State Funds Requested (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds Requested (Increases) *	-0-	-0-	-0-	-0-	-0-

II. Prepared by CHE

New State Funds To Be Considered For Recommendation (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds To Be Considered For Recommendation (Increases) *	-0-	-0-	-0-	-0-	-0-

CHE Code: 09-28
Campus Code: 9917
County: All 92 counties
Degree Level: 02
CIP Code: Federal – 150699; State – 150699

* Excludes new state dollars that may be provided through enrollment change funding.

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

August 28, 2009

I. Prepared by Institution

Institution/Location: Ivy Tech Community College of Indiana to be offered statewide via distance education technology
Program: Associate of Applied Science in Manufacturing Production and Operations

	Year 1 FY2010	Year 2 FY2011	Year 3 FY2012	Year 4 FY2013	Year 5 FY2014
Enrollment Projections (Headcount)					
Full-Time	20	32	39	41	41
Part-Time	55	88	106	112	112
Total	75	120	145	153	153
Enrollment Projections (FTE)					
Full-Time	20	32	39	41	41
Part-Time	28	41	50	53	53
Total	48	73	89	94	94
Degree Completions Projection	0	16	18	24	36
New State Funds Requested (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds Requested (Increases) *	-0-	-0-	-0-	-0-	-0-

II. Prepared by CHE

New State Funds To Be Considered For Recommendation (Actual) *	-0-	-0-	-0-	-0-	-0-
New State Funds To Be Considered For Recommendation (Increases) *	-0-	-0-	-0-	-0-	-0-

CHE Code: 09-28
Campus Code: 9917
County: All 92 counties
Degree Level: 03
CIP Code: Federal – 150699; State – 150699

* Excludes new state dollars that may be provided through enrollment change funding.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM A-5: **Academic Degree Programs on Which Staff Propose Expedited Action**

Staff Recommendation

That the Commission for Higher Education approve by consent the following degree program(s), in accordance with the background information provided in this agenda item:

- B.A. in Africana Studies to be offered by Indiana University at its IUPUI campus
- B.S. in Athletic Training to be offered by Indiana University Bloomington at Bloomington
- Technical Certificate in Industrial Technology to be offered by Ivy Tech Community College of Indiana-Richmond at Richmond and Connersville

Background

At its August and September 2004 meetings, the Commission for Higher Education began implementing a new policy on new academic degree programs on which staff proposes expedited action. These programs meet the criteria identified in that policy and are hereby presented for action by consent, in accordance with the aforementioned policy and the information presented in the supporting documents.

Supporting Documents

(1) *Background Information on Academic Degree Programs on Which Staff Propose Expedited Action*, August 28, 2009

(2) *Policy for New Academic Degree Programs on Which Staff Propose Expedited Action*, September 2, 2004

Background Information on Academic Degree Programs on Which Staff Propose Expedited Action

August 28, 2009

CHE 09-24 B.A. in Africana Studies to be offered by Indiana University at its IUPUI Campus

Proposal received on May 18, 2009
CIP Code: Federal – 050201; State – 050201
Projected Annual Headcount: 36; FTEs: 34; Degrees: 6
New State Funds Requested, Actual:
Year 1: $ 0
Year 2: $ 0
Year 3: $ 0
Year 4: $ 0
Year 5: $ 0

Ivy Tech Community College and Indiana University have worked out a unique articulation agreement for this program. Students at Ivy Tech can pursue the Humanities concentration within the A.A. in Liberal Arts and take 15 of the 62-65 semester hours required for the degree at IUPUI, although tuition for these courses would be at IUPUI rates. All A.A. credits would count toward the B.A. in Africana Studies. The 15 hours taken at Ivy Tech are all in subject areas that Ivy Tech would not typically teach.

CHE 09-25 B.S. in Athletic Training to be offered by Indiana University Bloomington at Bloomington

Proposal received on May 18, 2009
CIP Code: Federal – 510913; State – 510913
Projected Annual Headcount: 69; FTEs: 71; Degrees: 15
New State Funds Requested, Actual:
Year 1: $ 0
Year 2: $ 0
Year 3: $ 0
Year 4: $ 0
Year 5: $ 0

Indiana University seeks to split off Athletic Training, which is a separate major within the existing B.S. in Kinesiology, into a separate degree program. This needs to be done in order to maintain accreditation by the Commission on Accreditation of Athletic Training Education (CAATE). In FY2008, the B.S. in Kinesiology enrolled 1,963 headcount or 1,875 FTE students and had 351 graduates.

CHE 09-32 T.C. in Industrial Technology to be offered by Ivy Tech Community College of Indiana-Richmond at Richmond and Connersville

Proposal received on July 15, 2009
CIP Code: Federal – 150612; State – 150612

Projected Annual Headcount: 57; FTEs: 40; Degrees: 13
New State Funds Requested, Actual:

Year 1: $ 0
Year 2: $ 0
Year 3: $ 0
Year 4: $ 0
Year 5: $ 0

Ivy Tech Community College offers the T.C. in Industrial Technology throughout its system. Adding the Richmond and Connersville sites would enable Region 9 to have programmatic offerings similar to all other Ivy Tech regions and sites.

Policy for New Academic Degree Programs on Which Staff Propose Expedited Action

September 2, 2004

Pursuant to the Commission's desire to expedite action on new academic degree program requests whenever possible, the staff has identified a set of factors, which though not exhaustive, suggest when a request might be considered for expedited action by consent and when a request would require Commission consideration prior to action. With respect to the latter, the presence of one or more of the following factors might suggest a significant policy issue for which Commission attention is needed before action can be taken:

- Consistency with the mission of the campus or institution
- Transfer of credit
- New program area
- New degree level for a campus
- Accreditation
- Unnecessary duplication of resources
- Significant investment of state resources

In the absence of these factors or an objection from another institution, Commission staff will propose expedited action on new program requests. Examples of situations that pose no policy issues for the Commission include, but are not limited to:

- Adding a second degree designation to an existing program (e.g. A.S. to an A.A.S.)
- Delivering an on-campus program to an off-campus site through faculty available on-site or traveling to the site
- Adding a degree elsewhere in a multi-campus system to a new campus within the system.

All requests to offer new academic degree programs must continue to be accompanied by a full program proposal, unless otherwise specified in the guidelines. It is only after a proposal is received that a determination will be suggested as to how the request might be handled.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-1:	**Ball State University Central Campus Academic & Utility Project – Phase I**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Ball State University Central Campus Academic & Utility Project – Phase I*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-2:	**Indiana State University Life Sciences/Chemistry Laboratory Renovations and Chiller**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Indiana State University Life Sciences/Chemistry Laboratory Renovations and Chiller*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-3:	**Indiana University South Bend Education and Arts Building Renovation**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Indiana University South Bend Education and Arts Building Renovation*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-4:	**Indiana University Bloomington Laboratory Renovations – Jordan Hall**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Indiana University Bloomington Laboratory Renovations – Jordan Hall*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-5: **Indiana University Purdue University Indianapolis Life Sciences Laboratory Renovations**

Staff Recommendation

That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Indiana University Purdue University Indianapolis Life Sciences Laboratory Renovations*, as described in the project description and staff analysis dated September 11, 2009.

Background

By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.

Supporting Document

To be distributed, September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-6:	**Indiana University Bloomington Cyber Infrastructure Building New Construction**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Indiana University Bloomington Cyber Infrastructure Building New Construction*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, the Commission for Higher Education must review all projects to construct buildings or facilities of a cost greater than $500,000 regardless of the source of funds. A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-7:	**Ivy Tech Community College of Indiana Warsaw Campus New Construction**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Ivy Tech Community College of Indiana Warsaw Campus New Construction*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, the Commission for Higher Education must review all projects to construct buildings or facilities of a cost greater than $500,000 regardless of the source of funds. A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-8: **Ivy Tech Community College of Indiana Fall Creek Expansion Phase I**

Staff Recommendation

That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Ivy Tech Community College of Indiana Fall Creek Expansion Phase I*, as described in the project description and staff analysis dated September 11, 2009.

Background

By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.

Supporting Document

To be distributed, September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-9:	**Vincennes University Physical Education Building Renovation**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Vincennes University Physical Education Building Renovation*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-10: **Vincennes University Davis Hall Renovation**

Staff Recommendation

That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Vincennes University Davis Hall Renovation*, as described in the project description and staff analysis dated September 11, 2009.

Background

By statute, each repair and rehabilitation project must be reviewed by the Commission for Higher Education and approved by the Governor, on recommendation of the Budget Agency, if the cost of the project exceeds seven hundred fifty thousand dollars ($750,000) and if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students. Such review is required if no part of the project is paid by state appropriated funds or by mandatory student fees and the project cost exceeds one million dollars ($1,000,000). A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.

Supporting Document

To be distributed, September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-11:	**Vincennes University Multicultural Center New Construction**
Staff Recommendation	That the Commission for Higher Education recommend approval to the State Budget Agency and the State Budget Committee of the project *Vincennes University Multicultural Center New Construction*, as described in the project description and staff analysis dated September 11, 2009.
Background	By statute, the Commission for Higher Education must review all projects to construct buildings or facilities of a cost greater than $500,000 regardless of the source of funds. A project that has been approved or authorized by the General Assembly is not subject to review by the Commission for Higher Education. However, the Commission for Higher Education shall review a project approved or authorized by the General Assembly if the review is requested by the Budget Agency or the Budget Committee. This project was authorized by the General Assembly and the Commission has been requested by the State Budget Agency to review this project.
Supporting Document	*To be distributed,* September 11, 2009.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

DECISION ITEM B-12: **Capital Projects for Which Staff Proposes Expedited Action**

Staff Recommendation

That the Commission for Higher Education approve by consent the following capital project(s), in accordance with the background information provided in this agenda item:

- Indiana University Purdue University Indianapolis, Lilly House Renovation $2,576,000

Background

Staff recommends the following capital projects be recommended for approval in accordance with the expedited action category originated by the Commission for Higher Education in May 2006. Institutional staff will be available to answer questions about these projects, but the staff does not envision formal presentations. If there are questions or issues requiring research or further discussion, the item could be deferred until a future Commission meeting.

Supporting Document

Background Information on Capital Projects on Which Staff Propose Expedited Action, September 2, 2009

Background Information on Capital Projects on Which Staff Propose Expedited Action

September 2, 2009

A-2-10-2-06 IUPUI
Lilly House Renovation
Project cost: $2,567,000

The Trustees of Indiana University request authority to proceed with renovation of the Lilly House property located at 5807 Sunset Lane, Indianapolis, IN. The project includes mechanical/electrical upgrades, window replacement, restoration of hardwood floors and marble, and other interior finishes as needed. The project is funded by a grant from the Lilly Endowment. The total cost of the project is estimated to be $2,567,000.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

INFORMATION ITEM A: Status of Active Requests for New Academic Degree Programs

	Institution and Site	Program Title	Date Received	Status
1.	IU-Northwest	Master of Liberal Studies	01/16/09	On September agenda for action.
2.	ISU-Indpls. Aviation Technology Center	Master of Business Administration	05/05/09	On September agenda for action.
3.	IU-Indianapolis	M.A. in Applied Anthropology	05/18/09	On September agenda for action.
4.	IU-Indianapolis	B.A. in Africana Studies	05/18/09	On September agenda for action.
5.	IU-Bloomington	B.S. in Athletic Training	05/18/09	On September agenda for action.
6.	IU-East @ Lawrenceburg	M.S. in Education	05/18/09	Under CHE review.
7.	ITCCI-Statewide via Dist. Ed. Tech.	T.C./A.A.S. in Manufacturing Production & Operations	05/19/09	On September agenda for action.
8.	Purdue-North Central	B.A. in Social Work	06/09/09	Under CHE review.
9.	Purdue-West Lafayette	Ph.D. in Youth Development & Agricultural Education	06/09/09	Under CHE review.
10.	ITCCI-Richmond and Connersville	T.C. in Industrial Technology	07/15/09	On September agenda for action.
11.	Purdue-West Lafayette @ Anderson, Kokomo, Richmond, and South Bend via Statewide Tech.	B.S. in Engineering Technology	07/15/09	Awaiting information from Purdue.
12.	Ball State University	M.A. in Applied Behavior Analysis	07/28/09	Under CHE review.
13.	Ball State University	M.F.A. in Visual Arts	07/28/09	Under CHE review.
14.	Ball State University	B.A./B.S. in Sport Administration	07/28/09	Under CHE review.
15.	IU-East @ Lawrenceburg	B.S. in Communication Studies	08/14/09	Under CHE review.
16.	IU-East @ Muncie	B.S. in Criminal Justice	08/14/09	Under CHE review.
17.	ISU-Statewide via Dist. Ed. Tech.	M.A./M.S. in Recreation and Sport Management	09/02/09	Under CHE review.

INFORMATION ITEM B: Capital Improvement Projects on Which Staff Have Acted

In accordance with existing legislation, the Commission is expected to review and make a recommendation to the State Budget Committee for:

(1) each project to construct buildings or facilities that has a cost greater than $500,000;
(2) each project to purchase or lease-purchase land, buildings, or facilities the principal value of which exceeds $250,000;
(3) each project to lease, other than lease-purchase, a building or facility, if the annual cost exceeds $150,000; and
(4) each repair and rehabilitation project if the cost of the project exceeds (a) $750,000, if any part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students, and (b) $1,000,000 if no part of the cost of the project is paid by state appropriated funds or by mandatory student fees assessed all students.

Projects of several types generally are acted upon by the staff and forwarded to the Director of the State Budget Agency with a recommendation of approval; these projects include most allotments of appropriated General Repair and Rehabilitation funds, most projects conducted with non-State funding, most leases, and requests for project cost increase. The Commission is informed of such actions at its next regular meeting. During the previous month, the following projects were recommended by the Commission staff for approval by the State Budget Committee.

I. REPAIR AND REHABILITATION

G-0-09-2-02 University of Southern Indiana
General R&R Projects
Project cost: $560,963

The Trustees of the University of Southern Indiana request authority to proceed with general repair and rehabilitation projects, no single one of which exceeds $750,000. These projects are funded through federal American Recovery and Reinvestment Act funds as a restoration of FY 2009 State General Fund R&R appropriation reversions. The total cost of the projects is estimated to be $560,963.

A-1-10-2-08 Indiana University Bloomington
State Road 45/46 Bypass – Utility Relocation
Project cost: $1,800,000

The Trustees of Indiana University request authority to proceed with the relocation of steam, condensate, potable water, sanitary sewer, and telecommunications cable outside the construction limits of the State Road 45/46 Bypass widening project. The project is estimated to cost $1,800,000 and is to be funded through 2009-11 ARRA funds appropriated for General R&R ($924,100), I-Light Repair/Maintenance Reserves ($354,900), University Information Technology Reserves ($319,000) and Indiana University Foundation ($202,000).

II. NEW CONSTRUCTION

None.

III. LEASES

None.

IV. LAND ACQUISITION

None.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

INFORMATION ITEM C: Capital Improvement Projects Awaiting Action

Staff is currently reviewing the following capital projects. Relevant comments from the Commission or others will be helpful in completing this review. Three forms of action may be taken.

(1) Staff Action. Staff action may be taken on the following types of projects: most projects funded from General Repair and Rehabilitation funding, most lease agreements, most projects which have been reviewed previously by the Commission, and many projects funded from non-State sources.

(2) Expedited Action. A project may be placed on the Commission Agenda for review in an abbreviated form. No presentation of the project is made by the requesting institution or Commission staff. If no issues are presented on the project at the meeting, the project is recommended. If there are questions about the project, the project may be removed from the agenda and placed on a future agenda for future action.

(3) Commission Action. The Commission will review new capital requests for construction and major renovation, for lease-purchase arrangements, and for other projects which either departs from previous discussions or which pose significant state policy issues.

I. NEW CONSTRUCTION

B-1-08-1-02 Purdue University
Animal Disease Diagnostic Laboratory BSL-3 Facility
Project Cost: $30,000,000

Purdue University seeks authorization to proceed with the construction of the Animal Disease Diagnostic Laboratory BSL-3 Facility on the West Lafayette campus. The expected cost of the project is $30,000,000 and would be funded from 2007 General Assembly bonding authority. This project is awaiting a letter from the Budget Agency requesting review.

F-0-06-1-08 Ivy Tech Community College of Indiana
A&E Funds for Fall Creek Expansion, Indianapolis Campus
Project Cost: $4,464,850

Ivy Tech Community College of Indiana seeks authorization to proceed with the expenditure of Architectural and Engineering (A&E) planning funds for a New Construction project at the Fall Creek campus of ITCCI, Indianapolis. The 2007 Indiana General Assembly authorized $69,370,000 in bonding authority for expansion of the campus, which included funds for new construction, and for demolition and renovation of existing facilities. ITCCI is requesting release of $4,464,850 at this time, which would be used

to fund planning and for some demolition costs. The remaining bonding authorization would be requested at a later date. The expected cost of this project is $4,464,850 and would be funded from 2007 General Assembly bonding authority. This project is awaiting a letter from the Budget Agency requesting review.

F-0-02-1-12 Ivy Tech Community College of Indiana
Muncie/Anderson A&E
Project Cost: $4,800,000

Ivy Tech Community College of Indiana seeks authorization to proceed with the expenditure of Architectural and Engineering (A&E) planning funds for a New Construction and Renovation project at the ITCCI Muncie and Anderson sites. The nature and scope of the new construction projects are yet to be determined. The expected cost of the project is $4,800,000 and would be funded from 2007 General Assembly bonding authority. This project is awaiting a letter from the Budget Agency requesting review.

F-0-08-1-03 Ivy Tech Community College of Indiana
Bloomington New Construction A&E
Project Cost: $350,000

Ivy Tech Community College of Indiana seeks authorization to proceed with the expenditure of Architectural and Engineering (A&E) planning funds for a New Construction project at the ITCCI Bloomington campus. The expected cost of the project is $350,000 and would be funded from 2007 General Assembly cash appropriation. This project is awaiting a letter from the Budget Agency requesting review.

E-1-07-1-01 Vincennes University
Advanced Manufacturing and Training Center in Jasper
Project cost: $8,850,000

Vincennes University seeks authority to proceed with the construction of an Advanced Manufacturing and Training Center in Jasper. The total project cost is expected to be $8,850,000. The 2007 Indiana General Assembly authorized $8,000,000 in fee replaced bonding authority for this project. VU will raise the other $850,000. This project is awaiting a letter from the Budget Agency requesting review.

B-2-09-1-10 Purdue University Calumet Campus
Gyte Annex Demolition and Science Addition (Emerging Technology Bldg)
Project Cost: $2,400,000

The Trustees of Purdue University seek authorization to proceed with planning of the project Gyte Annex Demolition and Science Addition (Emerging Technology Bldg) on the Calumet campus. The expected cost of the planning of the project is $2,400,000 and would be funded from 2007 General Assembly bonding authority. This project is awaiting a letter from the Budget Agency requesting review.

B-4-09-1-21 Purdue University North Central
Student Services and Activities Complex A&E
Project Cost: $1,000,000

The Trustees of Purdue University seek authorization to proceed with planning of the project Student Services and Activities Complex. The expected cost of the planning of the project is $1,000,000 and would be funded from 2007 General Assembly bonding authority. This project is awaiting a letter from the Budget Agency requesting review.

B-3-10-1-05 Indiana University Purdue University - Fort Wayne
IPFW Parking Garage No. 3
Project Cost: $16,800,000

The Trustees of Purdue University seek authorization to proceed with the construction of the project IPFW Parking Garage No. 3 on the Fort Wayne Campus. The four level parking garage will be constructed on the north side of campus with room for approximately 1,000 automobiles. The expected cost of this project is $16,800,000 to be funded from 2009 Bonding Authority.

A-1-09-1-18 Indiana University – Bloomington
HPER Courtyard – Build-Out
Project Cost: $6,340,000

The Trustees of Indiana University seek authorization to proceed with the construction of the project Health, Physical Education , and Recreation Building (HPER) Courtyard Build Out. This project would allow the school to gain additional areal for use as faculty offices and instructional space. The proposal would construct a roof over the courtyard and build three levels within the space. The expected cost of the project is $6,340,000 to be funded as follows: $573,000 in gift funds; $500,000 indirect cost recovery reserves; and $5,267,000 through the issuance of certificates of participation in capital lease-purchase obligations between the university and the Indiana University Building Corporation.

II. REPAIR AND REHABILITATION

G-0-09-2-02 University of Southern Indiana
Multiple Repair and Rehabilitation Projects
Project cost: $560,963

The Trustees of University of Southern Indiana request authority to proceed with General repair and rehabilitation projects, no single one of which exceeds $750,000. These projects are funded through federal American Recovery and Reinvestment Act funds as a restoration of FY 2009 State General Fund R&R appropriation reversions. The total cost of the projects is estimated to be $560,963.

A-1-10-2-08 IU Bloomington
State Road 45/46 Bypass – Utility Relocation
Project cost: $1,800,000

The Trustees of Indiana University request authority to proceed with relocation of steam, condensate, potable water, sanitary sewer, and telecommunications cable outside the construction limits of the State Road 45/46 Bypass widening project. The project is funded by 2009-11 General Repair and Rehabilitation Funds, I-Light Repair/Maintenance Reserves, University Information Technology Systems Reserves, and Indiana University Foundation. The total cost of the projects is estimated to be $1,800,000.

III. LEASES

None.

COMMISSION FOR HIGHER EDUCATION
Friday, September 11, 2009

INFORMATION ITEM D: **Minutes of the August 2009 Commission Working Sessions**

MINUTES OF COMMISSION WORKING SESSIONS
Thursday, June 11, 2009

I. CALL TO ORDER

The Commission for Higher Education met in working session starting at 7:00 p.m. (ET) at Vincennes University, Isaac Beckes Student Union President's Room, Vincennes, Indiana, with Acting Chair Ken Sendelweck presiding. The following Commission members were present: Cynthia Baker, Jerry Bepko, Dennis Bland, Carol D'Amico, Jud Fisher, Gary Lehman, Marilyn Moran-Townsend, Chris Murphy, George Rehnquist, Ken Sendelweck, and Clayton Slaughter.

Also in attendance were Vincennes University President Richard Helton, Provost Ron Davis, Vice President for Financial Services and Governmental Relations Phil Rath, and Governor's Policy Advisor Scott Jenkins. Staff present was Jason Bearce, Catisha Coates, Haley Glover, Teresa Lubbers, and Jennifer Seabaugh.

II. DISCUSSION

A. Following dinner, Acting Chair Ken Sendelweck asked those present to observe a moment of silence in remembrance of Commission Member Dick Johnson, who passed away in late July. The group also made introductions to new Commission member Cynthia Baker, and new Commission staffer Jason Bearce.

B. President Helton, Provost Davis and Vice President Rath provided the Commission with an overview of Vincennes University's place in Indiana's system of higher education, and the institution's areas of focus, including Academic Transfer, Early College/Early Enrollment, Career and Technical Education, 4-year Degree Programs, and Business and Industry.

C. Following his presentation, President Helton also expressed the desire to revisit the funding formulas with members of the Commission, noting the inequities in the current formulas.

D. Associate Commissioner for Strategic Communications and Initiatives Jason Bearce spoke with the Commission about the 2009-10 Memorandum of Understanding that has been developed to support the work of the Education Roundtable. The MOU is organized under four key areas: Academic Standards, Teacher Effectiveness, College Readiness and Strategic Communications. The Commission for Higher Education supports the administrative needs of the Education Roundtable.

E. Associate Commissioner for Policy and Planning Studies Haley Glover announced to the group that the Commission and Ivy Tech had successfully applied to the Lumina Foundation for funding for the Accelerated Associate Degree Pilot Program. This initiative, highlighted in *Reaching Higher*, will provide up to 600 students with the opportunity to earn an Associate's Degree in less than one year. The Lumina Foundation will support the initiative at $2.34M over the next four years.

F. Haley Glover briefed the Commission on the status of an amendment to the 2007-13 Indiana-Kentucky Reciprocity Agreement. The amendment would open the Carroll County Campus of the Jefferson Community and Technical College to students from the south east counties in Indiana, and open Ivy Tech Sellersburg and IU-Southeast to students from Meade County Kentucky. The amendment will not change the balance of the agreement. The agreement is currently being reviewed by Indiana institutions.

G. Jason Bearce provided an update to the Commission on the changes to Teacher and Administrator Licensing proposed by the Department of Education. Carol D'Amico proposed that the Commission take a firm stance in teacher licensing issues, and pass a resolution in support of that stance. Commissioner Lubbers suggested that we let the Professional Standards Board act, and then weigh in on the issue.

H. Haley Glover offered a brief update on the status of Indiana's Making Opportunity Grant proposal. The proposal is due on September 11, 2009, and may provide Indiana with up to $2M over the next four years to develop and implement policies initiatives supporting the productivity agenda.

III. ADJOURNMENT

The Chair adjourned the meeting at approximately 9:00 p.m. (ET).

MINUTES OF COMMISSION WORKING SESSION
Friday, August 14, 2009

I. CALL TO ORDER

The Commission for Higher Education met in working session starting at 7:45 a.m. (ET) at the Vincennes University Indiana Center for Applied Technology, Room 142, Vincennes, Indiana, with Acting Chair Ken Sendelweck presiding. The following members were present: Cynthia Baker, Jerry Bepko, Dennis Bland, Carol D'Amico, Jud Fisher, Gary Lehman, Marilyn Moran-Townsend, Chris Murphy, George Rehnquist, Ken Sendelweck, and Clayton Slaughter.

II. DISCUSSION

A. Senior Associate Commissioner for Facilities and Financial Affairs and Chief Financial Officer Bernie Hannon presented information on the Commission's Core Operating Budget for Fiscal Year 2010. Noting that the state appropriation for the Commission decreased by 4% in this fiscal year, and that a planned reversion of 5% is incorporated into the budget, the Core Operating Budget is "in the black." This was accomplished through personnel changes—some vacant positions will not be replaced—and small reductions elsewhere. Gary Lehman questioned the Commission's reserve position, and asked whether this was unusual. Mr. Hannon responded that while it is unusual, the State is aware of the reserve. Due to its status as a quasi-public agency, the Commission is given latitude to manage ourselves, though we are not eligible for funding through the Salary Contingency Fund, for example. Carol D'Amico noted that most of the Commission's budget funds salaries, not Reaching Higher. Mr. Hannon responded that the Commission's plan is in its people. Staff aggressively seek external grants to support Reaching Higher initiatives, and will step up those efforts.

B. Clayton Slaughter suggested that staff may cut down on copying expenses at Commission meetings.

C. Chris Murphy indicated that staff should provide all Commission members with copies of all of the policies and procedures relating to the management of the Commission.

D. Jason Bearce and Learn More Indiana Team Leader Michelle Mitchell provided an overview of Learn More Indiana's Work Plan and Budget for Fiscal Year 2010. The budget is very similar to last year, and Learn More will be stepping up efforts to communicate the college and completion agenda across the state.

E. Marilyn Moran-Townsend announced that the Strategic Directions Subcommittee will start meeting again in September, and that College Completion and Teacher Quality will be front and center on the agenda.

F. Teresa Lubbers made some brief comments about the tuition targets discussion, and the tuition setting process at the institutions. In her opinion, the Commission's targets were developed and handled in a professional and thoughtful way. Chris Murphy added that we need to develop a more robust communications strategy to support this work, including comparisons to other states and indexing the cost to the quality. In his opinion, we cannot couch this work in Indiana's declining family income.

III. ADJOURNMENT

The Chair adjourned the meeting at 8:55 a.m. (ET).

2009
Indiana ACT, SAT & AP Results

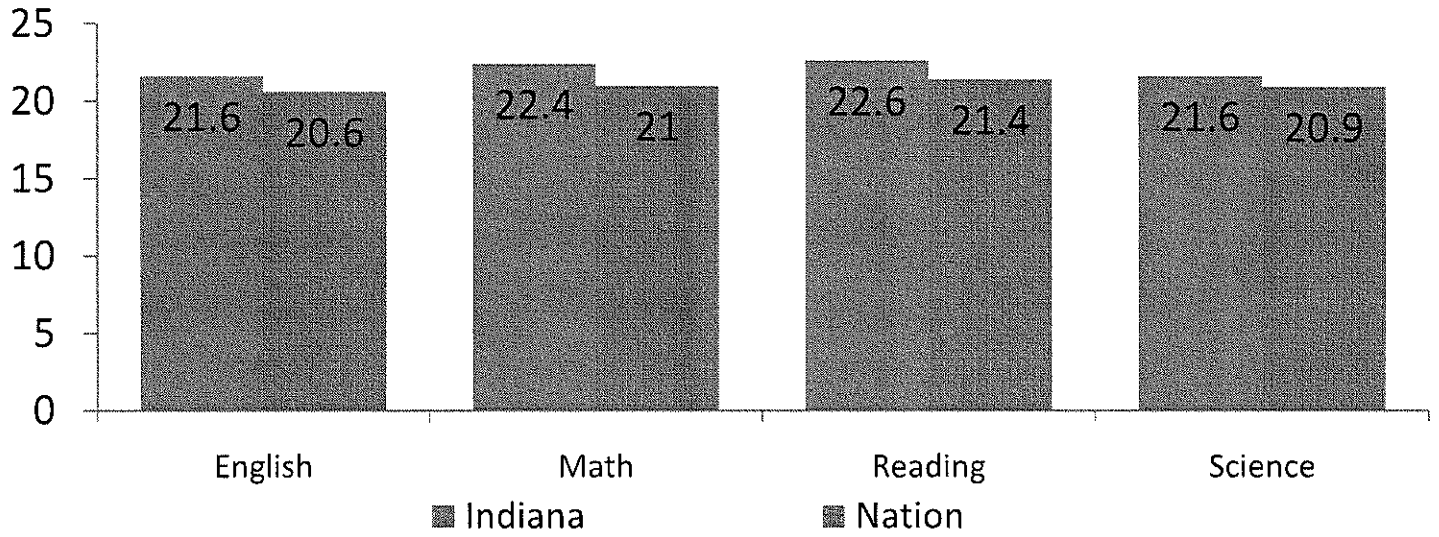
Commission for Higher Education

Information Item E

September 11, 2009

ACT: The Class of 2009

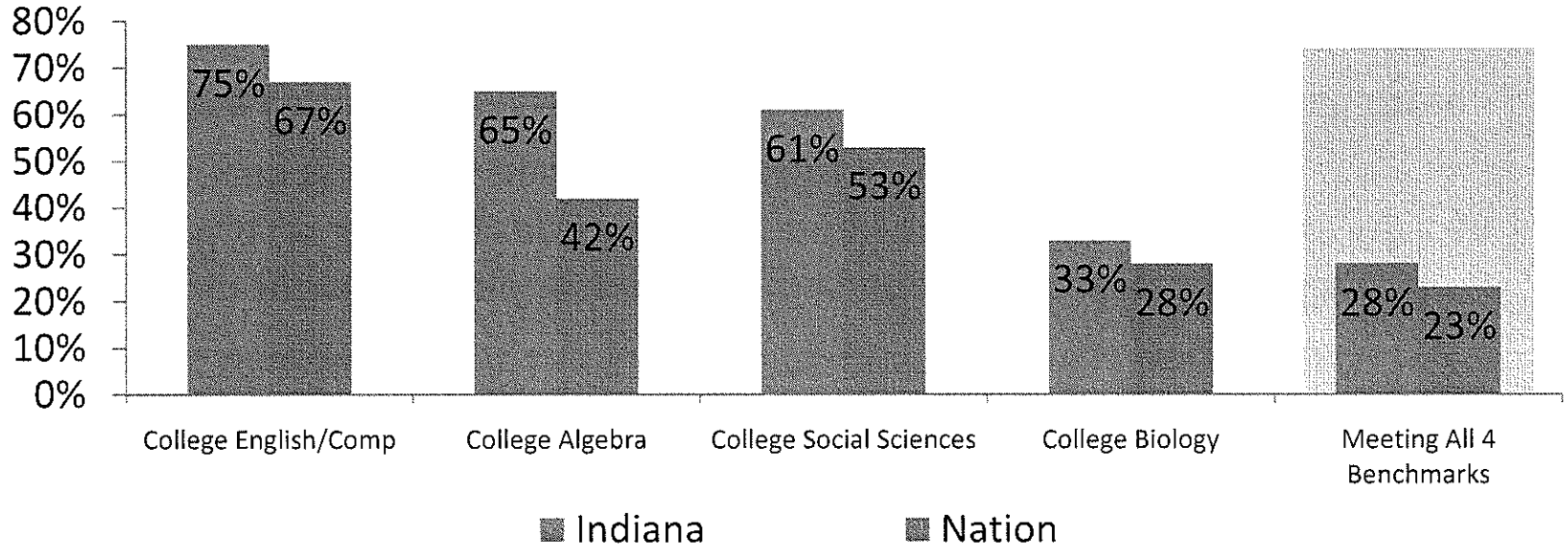
- 17,321 graduates took the ACT (24% of all graduates. 14 other states had lower proportional participation rates than Indiana.)
- Minority participation increased by 15.1% over the Class of 2008 (national minority participation increased by 12.7%)
- Indiana graduates scored more than a point higher than the nation on the ACT Composite Core (22.2 to 21.1)*
- Indiana outscored the nation in all four subject areas, as well



Source: ACT – Measuring College and Career Readiness, Class of 2009
*Statistical Significance: 0.1 points

ACT: The Class of 2009

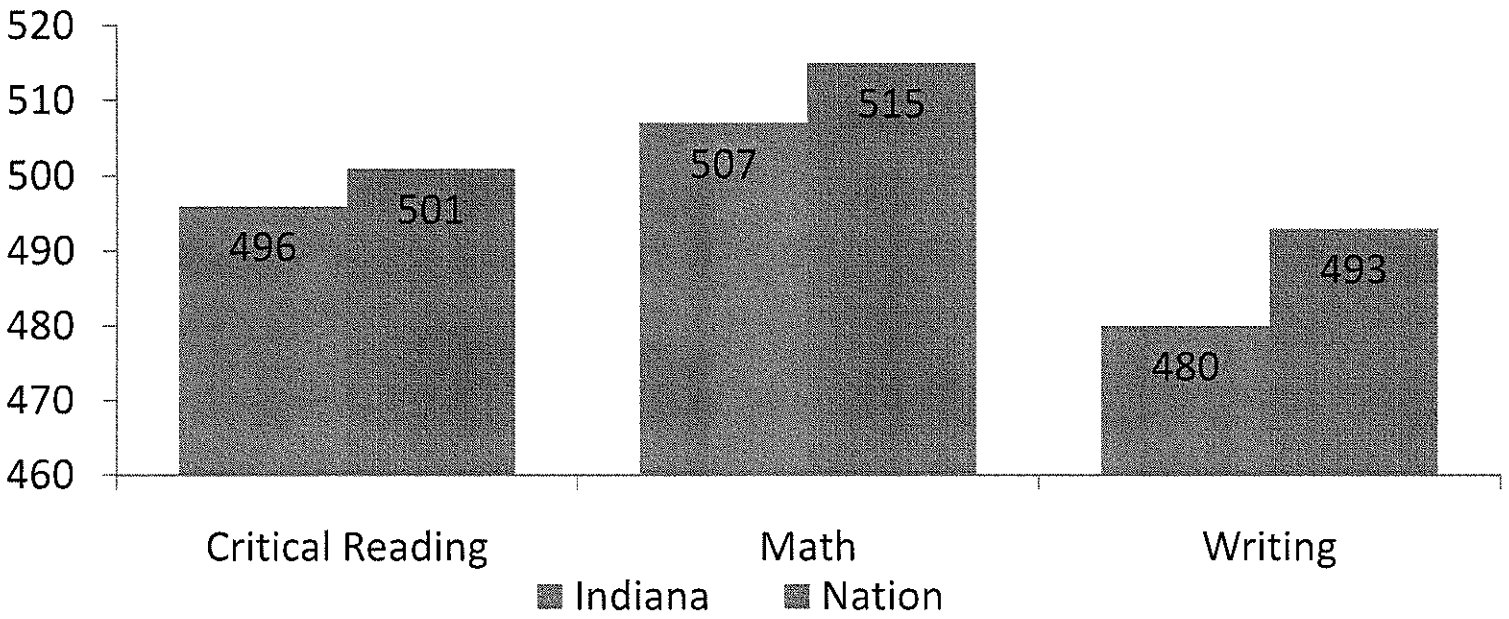
- ACT has developed a metric for college readiness for each subject
  - Indicates a 75% probability that a student will get into a college-level course and earn a C or higher
- Indiana outperforms the nation, but shows much room for improvement



Source: ACT – Measuring College and Career Readiness, Class of 2009

SAT: 2009

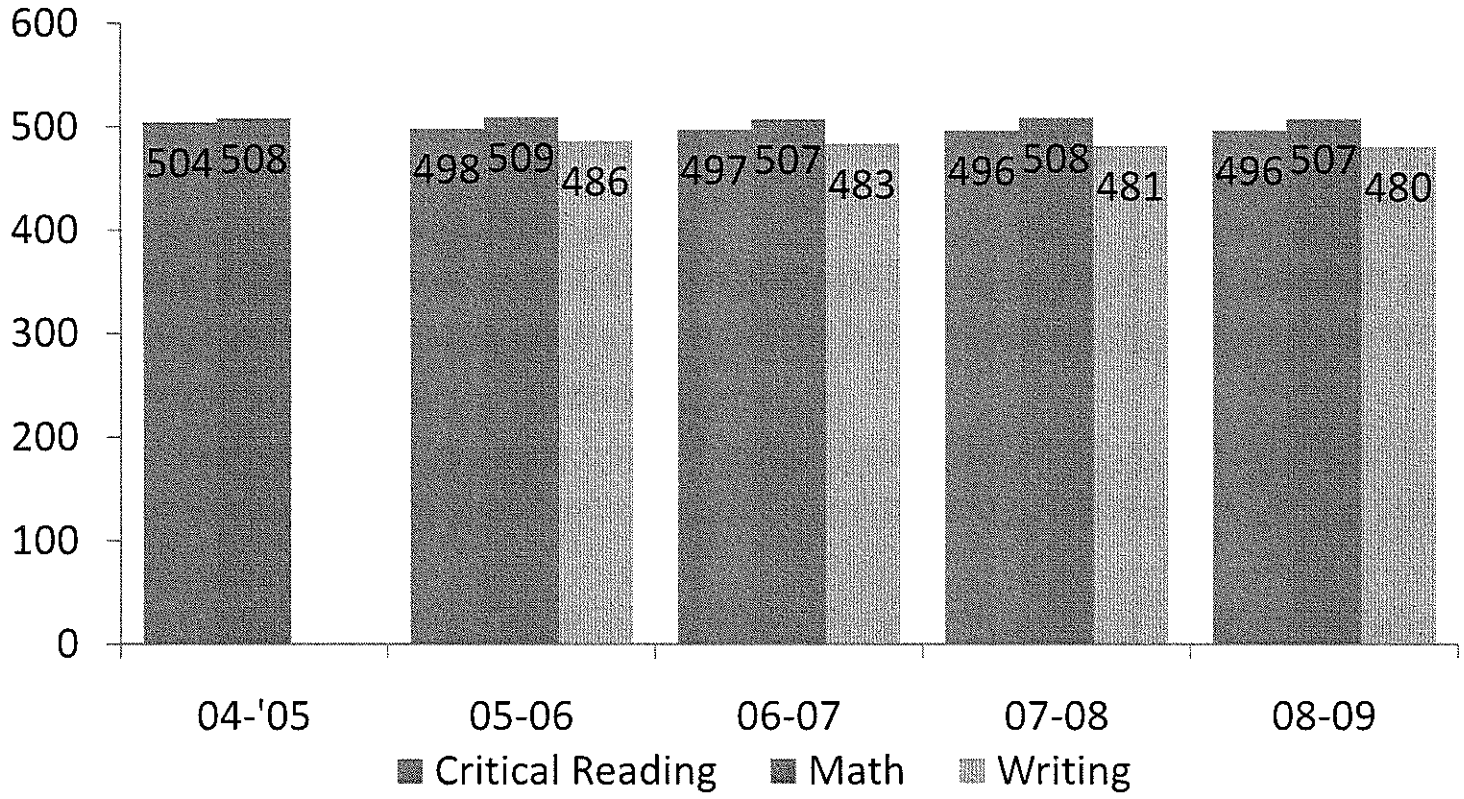
- 44,511 students took the SAT in 2008-09 (63% of the population)
- African American and Hispanic participation increased by 11.4% and 12.1% over 2008, respectively (national increases were 9.9% for African American students, and 16.5% for Hispanic students)
- Indiana continues to score lower than the national average in all three subject areas



Source: College Board, Indiana State Report 2009

SAT: 2009

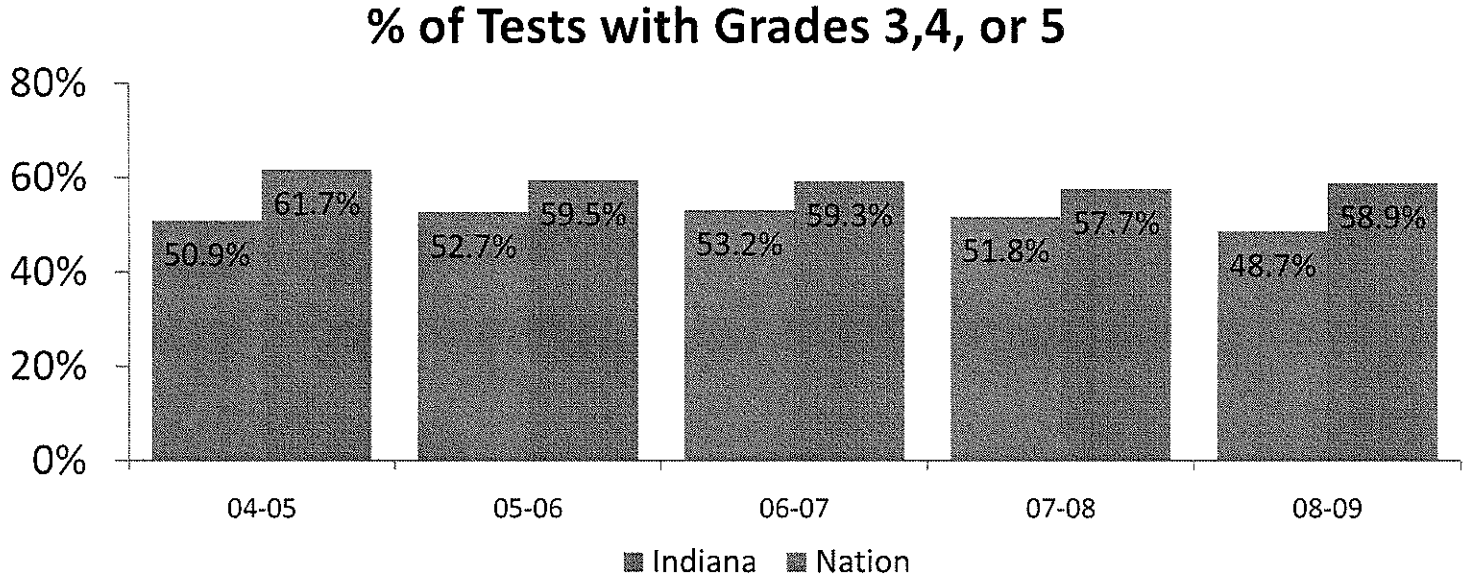
- Indiana's SAT scores have not changed significantly in years



Source: College Board, Indiana State Report 2009

AP: 2009

- 27,683 Hoosier students took an AP exam in 2009, up 19.1% from 2008 (national increase was 9.1%)
- African American and Hispanic student participation increased by 36.9% and 34.2%, respectively (national participation increased by 12.7% for African Americans and 13.1% for Hispanic students)
- Relatively fewer students earned a score of 3 or higher in 2009, likely resulting from the large increase in student participation. Indiana also continues to fall short of the national rate with grades 3-5.



Source: College Board, Indiana State Report 2009