ILLINOIS

Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE: Establish a major in Translational Medical Sciences in the College of Medicine for the degree of Master of Science.

SPONSOR: Stephen Boppart, Executive Associate Dean and Chief Diversity Officer, Carle Illinois College of Medicine, boppart@illinois.edu

COLLEGE CONTACT: King Li, Dean, Carle Illinois College of Medicine, kingli@illinois.edu

BRIEF DESCRIPTION:

The Carle Illinois College of Medicine (CI MED) seeks to establish a major in Translational Medical Sciences for the degree of Master of Science (MSTMS). This one-year, revenue-generating, professional special master's program is designed primarily for individuals interested in gaining experience in medical engineering, design, and innovation, including immersion in clinical settings and exposure to clinically-relevant problems in medicine and healthcare that are in need of technological solutions. The MSTMS program should primarily appeal to non-medical students seeking an interdisciplinary translational experience, and to those individuals pursuing a career path in the medical technology and healthcare industries for which biomedical technology design, medical systems exposure, and clinical exposure and research participation would be a beneficial experience. Completion of this degree program alone would not fulfill standard admissions requirements to medical school.

The MSTMS program will have a profound effect on the future of CI MED, as it will complement the college's MD program with additional efforts for teaching translational engineering practices for solving problems in medicine and healthcare. This MSTMS program will provide programmatic structure and impetus to help revolutionize the graduate curriculum in line with its primary mission of preparing students to be future leaders and innovators in healthcare.

The MSTMS program will consist of the following elements; a minimum of:

- 36 total credit hours.
- 20 credit hours of translational medicine-related coursework.
- 8 credit hours of technical electives.
- 8 credit hours of capstone project coursework.

See Appendix D for the detailed curriculum requirements, including admissions requirements.

JUSTIFICATION:
As technology evolves over the next twenty or thirty years, CI MED students will be trained to be at the forefront of those changes. The curriculum for the MSTMS program will capitalize on the pedagogical model developed by CI MED in which students are challenged to apply an innovation and engineering focus to medical education, and from which the students will graduate with technical expertise that will help them provide and contribute to better patient care.

The MSTMS curriculum will utilize a mixed model of lecture-based and team-based educational methodologies to optimize learning, and will have the following primary objectives:

1. Bridge the critical educational skills gap for students who are interested in medical and healthcare industries and would like to enhance their technical and science background in order to become more interdisciplinary.

2. Provide a "mini-medical school" setting in which students can become familiar with clinical problems, the clinical healthcare environment, and the clinical culture.

3. Create a shift in perspective regarding the traditional model of patient health care delivery by exposing students to a unique, quantitative, engineering-based approach to medical problems.

The MSTMS curriculum aligns with the high demand for engineering and quantitative science students wanting to apply their skills toward solving problems in medicine and healthcare. The opportunity to take more engineering- and science-based coursework, participate in medical engineering and design research projects, and be involved in a clinical immersion program, while networking and being mentored by physicians and medical school faculty, provide a solid foundation for those wishing to bolster their experience and credentials for careers in medical and healthcare technology fields.

While there are numerous options for an individual to pursue a straightforward master's degree in engineering or the life sciences, this is the only graduate program designed to provide students with a "mini-medical school" experience. By leveraging the strength of the CI MED program, we can provide a unique master's degree program in translational medical sciences, while addressing the demand to bridge the academic skills gap of students looking at careers in the medical and healthcare technology fields.

The target student audience for this new MSTMS program will not only be students who have recently completed undergraduate degrees in engineering or the quantitative sciences, but also non-physician scientists and engineers who plan to pursue an industry career in the biomedical arena, and wish to expand and diversify their training and proficiency by participating in an educational, healthcare immersion experience in a clinically-focused master's program. Being introduced to a condensed medical school program that combines clinical immersion with a biomedical capstone design experience is expected to be a significant draw to engineering or quantitative science students who want to enter the biomedical industry.

This MSTMS program is distinctly different from and does not overlap with the content in the Master of Engineering (MEng) program in the Department of Bioengineering, nor the Master's degree program in the School of Molecular and Cellular Biology. The MSTMS program is designed to provide direct immersion and exposure to clinical problems in need to technological solutions, and includes a "mini-med school" experience along with a focus on medical innovation and design through a capstone project. The MEng program in Bioengineering is focused on advancing technical breadth in bioengineering while developing a fundamental understanding of key business concepts. The Master's program in MCB is targeted toward biology students looking to take more advanced molecular and cellular biology-related courses in preparation for professional schools, such as medical school.

BUDGETARY AND STAFF IMPLICATIONS:

1) Resources
    a. How does the unit intend to financially support this proposal?

    The MSTMS program will be a self-supporting program with an In-State tuition of $36,000 and an Out-of-State tuition of $45,000/yr. (not including University fees or living expenses). As self-supporting, tuition dollars will be used to cover all the administrative expenses associated with program implementation. No supplemental state funding will be required for program support. Furthermore, aggressive efforts will be made to secure external funding to provide merit-based financial assistance targeted towards under-represented minority students. Tuition funds returned to the departments will be used as follows (not inclusive):

    - Faculty compensation for teaching classes, case study development, and course oversight
    - Staff salary (academic professional and administrative) for establishing standard operating procedures, structures, and policies
    - Active outreach to organizations and foundations for financial aid funding for under-represented minority students
    - Travel for recruiting qualified students
    - Aggressive marketing campaigns for broad program introduction
    - Miscellaneous expenses used for providing value-added student experiences such as external speakers, visits to clinical partners, and industry, etc.

    It is projected that the program will be self-supporting by end of the 3rd year after the program's launch (or earlier).

    b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

    The projected enrollment in the program is expected to begin small, with ~10-20 students in the first year and growing steadily in the following years. We would

manage the demands on class rooms and clinical immersion sites so that there will be no impact to the Carle Illinois College of Medicine MD students.

c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

A large proportion of the required coursework will be provided by CI MED. The remaining elective hours of the major will be delivered in a very flexible framework in which students are able to select courses from an extensive list of established campus offerings. This approach will provide the students with ample opportunity to individualize course selection according to personal interest and open enrollment availability. With these students distributed in courses delivered across the campus, it is not anticipated that additional course sections will be needed to accommodate the expected number of students in this major. However, any additional resources required to support student enrollment would be funded by tuition dollars. See Appendix B for college support letters.

d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

See Appendix A.

2) Resource Implications

a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

Core courses will be developed to meet the learning objectives of the MSTMS program. Current CI MED faculty will be invited to teach these core MSTMS courses, resulting in a broad distribution of the teaching load. If needed, additional specialized teaching faculty will be hired to teach the courses, with funds provided by MSTMS program tuition. Faculty outside of the College of Medicine who teach these core classes will be compensated via service-in-excess in addition to their normal teaching loads in their home department (i.e. teaching a class in CI MED may not count towards a faculty member's normal teaching load; therefore, compensation for their efforts is applied on top of their regular salary). Alternatively, if the faculty prefers and the home department agrees, instead of monetary compensation, teaching these core courses and the funding provided for it from CI MED may count toward the faculty's teaching load. This program will not involve the use of campus-level resources beyond those generally used for curriculum development or the delivery of instruction.

b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units.

Based on current enrollment projections, it is not anticipated that this program will have any significant impact on enrollment in any single particular academic unit, since the program only requires 8 credit hours of elective classes, and since there are

a large number of on-campus classes to choose from. CI MED had a formal discussion with the Dean of LAS, primarily to discuss that our students may choose to take 100 & 200 level core classes since this MSTMS program will target engineering students who may choose to take introductory biology courses. It is recognized, however, that only 400- and 500-level courses will count for graduate credit for this graduate MSTMS degree. See Appendix B.

c. Please address the impact on the University Library *(A letter of estimated impact from the University Librarian must be included for all new program proposals. If the impact is above and beyond normal library business practices, describe provisions for how this will be resourced.)*

   No additional impact on the University Library – See Appendix C.

d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

   No additional impact on computer use, laboratory use, or equipment is expected.

For new degree programs only:

3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.

   The introduction of this Master's degree program is consistent with CI MED's scholarly mission of developing the next generation of leaders and clinicians who, through technology and innovation, are life-long learners and creative problem solvers of non-traditional challenges in healthcare. It will also intrinsically incorporate collaborations across campus through faculty teaching and case study development.

   Although the curriculum is based on the engineering-based CI MED program, the fundamental basic science and clinical knowledge gained by students completing the MSTMS program will provide clinical experiences and perspectives that they would not receive in traditional engineering-based programs. It will have a far-reaching impact on developing engineers and scientists who work in highly collaborative environments and who are trained at evaluating clinical cases through the lens of technology. This MSTMS program will allow CI MED to create a fundamental shift on how future engineers and scientists approach problems in medicine and healthcare.

   At the campus level, this Master's program supports one of the University's primary goals, as outlined in the Illinois Strategic Plan – to provide transformative learning experiences. The MSTMS program will feature in-class lectures as well as clinical rounds and a design innovation project experience. The coursework will provide a deep understanding of the gaps and opportunities in medical technology, while the engineering rounds will complement the student's in-class coursework, allowing them to begin designing engineering solutions to

address the identified medical needs. These transformative learning experiences will benefit those looking to enter the healthcare industry or start-up realm. These efforts will create new avenues to careers in clinical, industry, and research positions.

4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?

The curriculum for the MSTMS program aligns with the high demand to develop more engineers and scientists who wish to directly address the problems and challenges in medicine and healthcare. Completion of a special Master's program would provide the opportunity to expand their knowledge of advanced engineering, physical, design, and biological science topics, and show proven academic performance in a "mini-medical school" environment. A chart showing competitive SMP programs is also attached as Appendix E.

Over the last three application/admission cycles, CI MED has experienced an overwhelming response to our shared vision that the future of healthcare lies at the intersection of engineering and medicine. The number of students applying to our MD program has been 1090, 2350, and over 3100 for the last three years, competing to fill 32, 32, and 40 slots, respectively. While we recognize that students not accepted into our CI MED MD program will likely be highly competitive for other medical schools, it is also recognized that of the 57,777 students applying to medical schools for the 2018-2019 school year, according to the Association of American Medical Colleges, only 41% (21,622) matriculated. We expect that there are a large number of engineering and quantitative science students who may choose not to pursue an MD degree, but would see the benefit of completing our MSTMS program for the "mini-med school" experience, and for gaining clinical exposure and perspective to better their credentials and career paths in the medical and healthcare technology industries.

In addition, there is a significant gap in underrepresented minority (URM) students in STEM fields, but this gap is less in more humanistic engineering fields such as bioengineering. Through aggressive recruitment of URM students, the MSTMS program can help address this educational gap for those who are driven by personal motivations and experiences, and are looking to apply their technical skills to solving problems that directly affect individuals, as well as communities, in very humanistic ways. With financial support from external foundations, a limited number of merit-based scholarships may be made available to encourage URM students to apply to our MSTMS program.

Professional Development Workshops
We believe that a characteristic of an outstanding special Master's program is an effective professional development program. Depending on the needs of the students, professional development workshops will be hosted for those interested in various careers in the healthcare industry, including healthcare innovation, medical technology design, healthcare systems management, and patient-technology and doctor-technology interfaces. Workshop topics may also include communication, leadership development, management and team-building skills, etc.

5) If this is a proposed graduate program, please discuss the programs intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?

   This program will not utilize tuition waivers.

DESIRED EFFECTIVE DATE: *(Proposals may not be implemented until they go through all necessary levels of approval. The Provost's office will inform the sponsors in writing when they may implement their proposal. Proposed changes may not be publicized as final on any web sites, printed documents, etc. until written confirmation of final approval is issued.)*

Summer 2021, depending on approval date and program readiness.

STATEMENT FOR PROGRAMS OF STUDY CATALOG: *(All proposals must include either a new or revised version of the entry in the Programs of Study Catalog, if applicable. Entries will be published as approved by the Senate. Future changes in the statement for Programs of Study Catalog which reflect changes in the curriculum, must go through the normal review process at the appropriate levels.)*

See Appendix F.

Appendix A:

Carle Illinois
COLLEGE OF MEDICINE

807 S. Wright Street, Suite 320, MC-325
Champaign, IL 61820

Carle ILLINOIS

August 28, 2018

Wojtek Chodzko-Zajko
Dean, Graduate College
204 Coble Hall
MC-322

Dear Dean Chodzko-Zajko:

The curriculum committee and the faculty executive committee, on behalf of the Faculty of the Carle Illinois College of Medicine, has voted to approve the following proposal:

Establish a degree in the Carle Illinois College of Medicine for the degree of Master of Science.

As outlined in the attached document, resources from the College will be used to create and launch the degree program outlined in this proposal, but is expected to be a self–sustaining degree program, as outlined on the attached budget projections.

This proposal is now ready for review by the Graduate College.

Sincerely,

King Li
Dean, Carle Illinois College of Medicine and
Chief Academic Officer, Carle Health System

Enclosure

c: R. Bashir
J. Rowen

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
217.300.5700 | medicine.illinois.edu

Appendix B:

ILLINOIS

COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

Office of the Dean
227 Mumford Hall, MC-710
1301 W. Gregory Drive
Urbana, IL 61801

November 7, 2018

To the Members of the Graduate School:

The College of Agricultural, Consumer and Environmental Sciences supports the creation of the Master of Translational Sciences to be offered through the Carle Illinois College of Medicine. We support the courses from our college being used as elective courses for this program. If offered, the classes listed below would have the capacity to enroll approximately 10 students per year. If enrollment surpasses course capacity, we will work with the College of Medicine to hire additional staff and make other arrangements as necessary. We also understand the course list is not inclusive, and we will consider enrollment in additional courses based on capacity.

Sincerely,

Kimberlee Kidwell, Dean
Robert A. Easter Chair
College of Agricultural, Consumer, and
Environmental Sciences (ACES)

Courses offered through ACES:

ABE 446	Biological Nanoengineering
ANSC 431	Advanced Reproductive Biology
ANSC 440	Applied Statistical Methods I
ANSC 441	Human Genetics
ANSC 445	Statistical Methods
ANSC 446	Population Genetics
ANSC 447	Advanced Genetics and Genomics
ANSC 448	Math Modeling in Life Sciences
ANSC 449	Biological Modeling
ANSC 450	Comparative Immunobiology
ANSC 453	Stem Cell Biology
CPSC 501	Programming for Genomics

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
217.333.0460 • aces.illinois.edu

ILLINOIS

COLLEGE OF APPLIED HEALTH SCIENCES

Office of the Dean
110 Huff Hall, MC-586
1206 S. Fourth St.
Champaign, IL 61820 USA

10/8/18

To the Members of the Graduate School:

The College of Applied Health Sciences supports the creation of the Master of Translational Sciences to be offered through the Carle Illinois College of Medicine. We support the courses from our college being used as elective courses for this program. If offered, the classes listed below would have the capacity to enroll approximately 10 students per year. If enrollment surpasses course capacity, we will work with the College of Medicine to hire additional staff and make other arrangements as necessary. We also understand the course list is not inclusive, and we will consider enrollment in additional courses based on capacity.

Sincerely,

Cheryl Hanley-Maxwell

Cheryl Hanley-Maxwell, Ph.D.
Dean, College of Applied Health Sciences

Courses offered through AHS:

IHLT 474	Pre-Field Experience in Health
IHLT 475	Field Experience in i-Health
CHLH 402	Cancer Epidemiology
CHLH 404	Gerontology
CHLH 405	Aging with Disability
CHLH 407	Disability, Culture & Society
CHLH 409	Women's Health
CHLH 410	Public Health Practice
CHLH 415	International Health
CHLH 421	Health Data Analysis
KIN 450	Biochemistry of Exercise
KIN 451	Skeletal Muscle Physiology
KIN 457	Motor Learning & Control
KIN 458	Neurobio of Aging
KIN 470	Exercise Endocrinology

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

217.333.2131 • (f) 217.333.0404 • ahs.illinois.edu

ILLINOIS

COLLEGE OF ENGINEERING

Office of the Dean
306 Engineering Hall, MC-266
1308 W. Green St.
Urbana, IL 61801

April 10, 2019

To the Members of the Graduate School:

The College of Engineering supports the creation of the Master of Translational Sciences to be offered through the Carle Illinois College of Medicine. We support the courses from our college being used as elective courses for this program. If offered, the classes listed below would have the capacity to enroll approximately 10 students per year. If enrollment surpasses course capacity, we will work with the College of Medicine to hire additional staff and make other arrangements as necessary. We also understand the course list is not inclusive, and we will consider enrollment in additional courses based on capacity.

Sincerely,

Rashid Bashir, Dean
Grainger Distinguished Chair in Engineering
Professor of Bioengineering

Courses offered through the College of Engineering:

BIOE 414	Biomedical Instrumentation
BIOE 415	Biomedical Instrumentation Lab
BIOE 420	Intro Bio Control Systems
BIOE 476	Tissue Engineering
BIOE 479	Cancer Nanotechnology
BIOE 480	Magnetic Resonance Imaging
BIOE 487	Stem Cell Bioengineering
BIOE 504	Analytical Methods in Bioeng
BIOE 505	Computational Bioengineering
BIOE 506	Molecular Biotechniques
BIOE 507	Advanced Bioinstrumentation
ECE 414	Biomedical Instrumentation
ECE 415	Biomedical Instrumentation Laboratory
TAM 461	Cellular Biomechanics
ME 481	Whole-Body Musculoskel Biomech
ME 482	Musculoskel Tissue Mechanics
ME 483	Mechanobiology

ILLINOIS

COLLEGE OF LIBERAL ARTS & SCIENCES

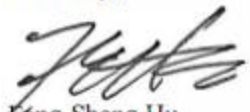
Office of the Dean
2090 Lincoln Hall, MC-448
702 S. Wright St.
Urbana, IL 61801

March 11, 2019

Dear Dean Li:

The College of Liberal Arts and Sciences supports the creation of the Master of Translational Sciences to be offered through the Carle Illinois College of Medicine. If offered, the classes listed below would have the capacity up to 10 students per year for students in this program. If enrollment in these courses surpasses capacity due to the inclusion of CICOM students, we understand that the College of Medicine will be in contact with LAS to make any necessary arrangements for instructional support and/or classroom space accommodations. We also understand that the course list is not inclusive, and we will consider enrollment in additional undergraduate courses based on capacity.

Sincerely,



Feng Sheng Hu
Harry E. Preble Dean

Courses offered through LAS:

CHEM 102	GENERAL CHEMISTRY 1
CHEM 103	GENERAL CHEMISTRY LAB 1
CHEM 236	FUNDEMENTAL ORGANIC CHEMISTRY 1
CHEM 237	STRUCTURE AND SYNTHESIS
MCB 150	MOLEC & CELLULAR BASIS OF LIFE
STAT 100	STATISTICS
STAT 200	STATISTICAL ANALYSIS
STAT 212	BIOSTATISTICS

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
217.333.1350 • las.illinois.edu

carle.org | 611 W. Park Street, Urbana, IL 61801

Carle
CARLE FOUNDATION HOSPITAL

September 19, 2018

Rashid Bashir, PhD.
Executive Associate Dean and Chief Diversity Officer, Carle Illinois College of Medicine
Bioengineering
807 S. Wright Street
Suite 320
M/C 325

Dear Dr. Bashir:

Carle Foundation Hospital recently received a proposal from your office outlining plans to develop a new Translational Medical Sciences in the Carle Illinois College of Medicine for the degree of Master of Science.

Based upon the documents received, it is our belief that there will be no impact on the instruction currently given to the Carle Illinois College of Medicine MD students or the Residency Program. The development of the Carle Illinois program has provided a great opportunity for us to collaborate as we identify needs and outline resources necessary to support such an ambitious program. We are already supporting the MD program and see no meaningful changes in our operations as a result of the College's support of this new degree.

If additional services or materials are required as the program further develops, we will be happy to discuss those needs as they emerge.

Sincerely,

Matthew D. Gibb, MD
Executive Vice President - System Chief Medical Officer

Appendix C:

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

University Library
Office of University Librarian and Dean of Libraries
230 Main Library, MC-522
1408 West Gregory Drive
Urbana, IL 61801

August 28, 2018

Rashid Bashir
Executive Associate Dean and Chief Diversity Officer, Carle Illinois College of Medicine
Bioengineering
807 S. Wright St.
Suite 320
M/C 325

Dear Dr. Bashir:

The University Library recently received a proposal from your offices outlining plans to Translational Medical Sciences in the College of Medicine for the degree of Master of Science.

Based upon the documents received and Peg Burnette, it is our belief that there will be no impact on the University Library. The development of the Carle-Illinois College of Medicine has provided a great opportunity for us to collaborate as we identified needs and outlined resources necessary to support such an ambitious program, with the new funding provided by the Provost to support medicine-related needs. We are already supporting this program and see no meaningful changes in our operations as a result of the College's support of this new degree.

If additional services or materials are required as the programs further develop, we will be happy to discuss those needs as they emerge.

Sincerely,

John P, Wilkin
Juanita J. and Robert E. Simpson
Dean of Libraries and University Librarian

e-c: Peg Burnette
James Pait, Director of Project Management, Carle IL COM Administration
Thomas Teper

phone 217-333-0790 • *fax* 217-244-4358

Appendix D:

Master of Science in Translational Medical Sciences

Program Description

- One-year (Summer, Fall, and Spring), non-thesis, 36 credit hours

Curriculum

Using team-based learning and clinical translational activities, the MSTMS curriculum will integrate graduate level coursework in the physical, biological, and engineering sciences with skills development in critical thinking, communication, and teamwork. It will feature a case-driven, team-learning, and lecture-based curriculum that will not only be student-centric, but will also mirror CI MED's unique approach of integrating innovation with clinical practice and engineering design. Students may also participate in hands-on demonstrations of medical devices to better appreciate usability and challenges in the clinical environment, allowing them to begin designing engineering solutions to address the identified medical needs. Furthermore, students will be trained to evaluate clinical cases as system-wide biological problems.

Core classes will be developed specifically for the MSTMS program. These classes will feature case studies and in-class lectures, as well as clinical rounds at Carle, at local public health clinics such as Frances Nelson Health Center, and at rural hospitals to provide a real-world understanding of clinical challenges and patient care at these medical facilities. For scalability purposes, case studies used in the pre-clinical medical school curriculum (Phase 1) will be repurposed for a team-based learning approach. The curriculum will be rounded off with a capstone design innovation project experience.

Summer semester (12 credit hours)

- BSE 612 - Foundational Elements (10 credit hours)
- BSE 621 – Clinical Immersion (2 credit hours)

Fall semester (12 credit hours)

- BSE 622 – Translational Medical Sciences I (4 credit hours)
- BSE 624 – Clinical Capstone Project I (4 credit hours)
- Technical elective (4 credit hours)

Spring semester (12 credit hours)

- BSE 623 – Translational Medical Sciences II (4 credit hours)
- BSE 625 – Clinical Capstone Project II (4 credit hours)
- Technical elective (4 credit hours)

Capstone Project

The team-based major-specific Capstone Project is aimed at application of some of the principles learned during coursework. The projects will have the following characteristics:

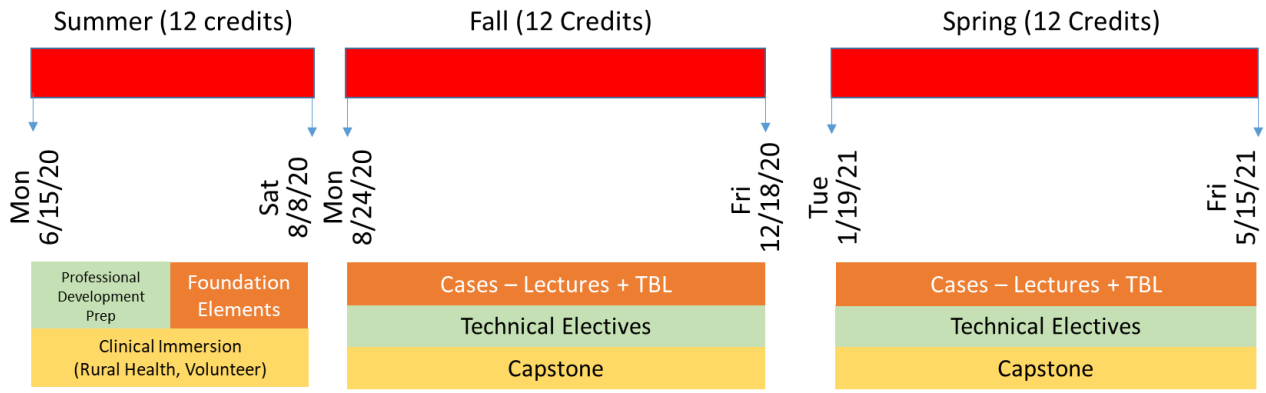
- Will be performed and completed over the Fall and Spring semesters.
- Will be performed by teams of 3 to 5 students.

- Will represent project ideas that were generated by the MSTMS students during the summer clinical immersion experience, as well as project ideas from Carle Foundation Hospital physicians.
- Will culminate in a written report that describes the background of the problem, definition of milestones, alternative approaches considered, selection of an approach, engineering design/analysis, construction of hardware (if applicable), development and validation of software (if applicable), and analysis of whether the milestones had been achieved.
- The project will also culminate in an oral presentation to be made to the class, industry mentors, and the core faculty. Each student must participate in delivering a section of the oral presentation.

Admissions Requirements

- Bachelor's degree in engineering, science, or related discipline.
- Minimum GPA of 3.0 on a 4.0 scale for the last two years of undergraduate study.
- Official transcripts from undergraduate degree program.
- GRE scores (70^{th} percentile or higher).
- 3 letters of recommendation.
- Personal statement.
- Resume or curriculum vitae (CV) highlighting work and/or research experiences.
- For applicants whose undergraduate degree is not from an institution where English is the official language, TOEFL or IELTS test results are required.
- Applicants with non-engineering degrees need to demonstrate a solid foundation in the quantitative sciences during their undergraduate studies. This includes coursework in physics, computation or computer science, advanced math (through calculus, linear algebra, and differential equations), or advanced quantitative chemistry, biology, or physiology courses.
- Applicants from rural or underserved regions, and/or those who have been disadvantaged or underrepresented for racial, social, or economic reasons, are encouraged to apply if you are able to demonstrate the motivation and determination for completing this degree program.
- No course credit from courses taken at other institutions will be given toward the completion of this degree.

Masters Program Curriculum Map
(Example 2020-2021)



- Foundational Elements: Same time as the M1 class
- Cases: CI-MED Cases converted to Lecture and TBL, 1 case from each course
- Professional Development Prep: workshops in communication, leadership, team-building, etc.
- Capstone: Clinical Problem and Engineering Solution, Intro to Entrepreneurship, FDA, Regulatory, etc.
- Technical Electives: Approved 400, 500, 600 level courses

Program Value-Adds

To provide an enhanced student experience and result in a more attractive program, the following features may be provided as value-adds (not inclusive):

- Recommendation letters from mentoring faculty and physicians.
- Leverage the exposure to and brand identification with CI MED.
- Professional development training for careers at the interface between engineering and medicine.
- Advice and mentoring from industry mentors and Entrepreneurs in Residence (EIRs) from the Office of Technology Management.

Appendix E:

Competitive Analysis of Comparable SMP Programs

School Name	Degree name	Length to degree	Tuition (in-state/out of state, if applicable), not including fees	Value-adds/Notes	Number of students accepted
Univ of Cincinnati	MS in Physiology	1 year (11 months) – 32 credit hours	$37,000	• Attend same lectures and take identical exams as first-year medical students (side-by-side), including lab courses, allowing their performance to be ranked against first-year students • Shadowing faculty • Mid-term progress reports on 2 to 3 classes, allowing the students to submit these grades as part of their medical school application • Automatic interview with Univ of Cincinnati medical school, if student meets certain academic criteria • Mock interview sessions to gain insight to medical school interview process	32

Eastern Virginia Medical School	MS in Biomedical Sciences	1 year (2 semesters) – 32 credit hours	$40,911/$49,273	• Learn side-by-side with M1 med students • Mentorship with M1 student who have completed this SMP • Quick decision (2 weeks upon applying to program) • Potential opt-out of medical courses if accepted into EV MD program • Letters of recommendation from program	59
Georgetown	MS in Physiology	1 year (11 months) – 32 credit hours	$52,818	• Take medical classes alongside the first-year medical students, and are graded directly against them • Automatic interview with Georgetown Univ medical school based on academic performance • Personalized support and advising, as students apply to medical school • Each student is assigned an advisor who will also write their letter of recommendation • Interview workshops, AMCAS application advice and volunteer opportunities	

				• Modified block schedule of classes that allow some classes to be completed before the end of the Fall semester, so performance in those classes can be brought to the attention of medical schools that the student is still under consideration for in the Spring	
Rosalind Franklin University	MS in Biomedical Sciences	1 year (10 months)	$47,142	• Granted interview in another Rosalind Franklin health professional program, based on academic performance	93
Western Univ of Health Sciences	MS in Medical Sciences	1 year (12 months)	$27,495	• There is another program, MS in Medical Sciences, that focuses on under-represented students	56
Drexel Univ	MS in Interdepartmental Medical Science	1 year (11 months)	$14,314	• Faculty advisor who will meet with the student regularly and eventually write a letter of evaluation for application to health professional schools • Grades are based on the performance of the medical school class • The tuition associated with the Interdepartmental	

				Medical Science program is less than the tuition for a typical one-year special master's program.	
Regis University	MS in Biomedical Sciences	1 year - 32 credit hours	$28,640 ($895 /credit hour)		20-24
Tufts	MS in Biomedical Sciences	1 year – 2 semesters	$50,438	• Curriculum follows M1 program, courses based upon or identical to the M1 courses • Computer-based anatomy course to all students and to teach an introductory clinical medicine course that gives students a taste of working with patients.	
Rutgers	MS in Biomedical Sciences	1 year	$26,160/$33,780		
Wayne State Univ	MS in Basic Medical Sciences	1 year (3 semesters) – 34 credit hours	$21,650/$45,050	• Degree requires a literature review project and essay evaluating a current problem in biomedical science	
Boston University	MS in Medical Sciences	1 to 2 calendar years – 32 credit hours	$54,720	• Curriculum closely aligned (or identical) with the first-year medical curriculum at Boston University School of Medicine	

Loyola Univ	MA in Medical Sciences	1 year (9 months) – 24 credit hours	$44,160 ($1,840/credit hour)	• Premedical advising upon entry to the program, through post-graduation, on every aspect of a student's medical school application • Comprehensive committee letters on qualified student's behalf to medical school • Facilitates access to Chicago-area hospitals and clinics with opportunities to work with underserved populations • Weekly workshops to familiarize students with individual medical schools, to strengthen their medical school applications, and to discuss ethical issues and social justice efforts with experts in the field • Automatic admission interview to Loyola Univ School of Medicine, based on academic performance	

Appendix F:

Statement for the Programs of Study Catalog *(Copy noted in red are the suggested edits to the current Carle Illinois College of Medicine catalog page.)*

Carle Illinois College of Medicine

The University of Illinois at Urbana-Champaign Doctor of Medicine (MD) program is conducted on the Urbana Campus in the Carle Illinois College of Medicine. The college offers a professional, four-year MD degree program that integrates engineering concepts with the traditional pillars of medicine, namely the basic health sciences and clinical training, and prepares students for postgraduate medical education programs. This curriculum produces students who are trained and equipped to incorporate analytical and quantitative techniques, modeling and computation, innovation, and human systems approaches to advancing and delivering high quality healthcare. The curriculum emphasizes professional, compassionate, and ethical care and the utilization of team-based approaches to transform healthcare delivery and improve healthcare outcomes through the continuum of care: preventive medicine through acute care. In addition to required courses, elective rotations provide opportunities for students to explore specialized areas of interest. Students have the option to complete a research thesis that may lead to the award of an MD degree with High Honors. The educational program spans four (4) years. Students are exposed to extensive clinical training, professional development and scientific and engineering education through a case-driven active learning curriculum.

Carle Illinois College of Medicine also offers a one-year, non-thesis, Master of Science in Translational Medical Sciences degree. For information about this program, visit medicine.illinois.edu.

Admission

The college selects applicants with the best combination of academic and extracurricular achievement, maturity, integrity, and motivation. Selection of students is based on an assessment of all available data and an evaluation of skills and aptitude. The quality of work in all subject areas is considered, with an emphasis on quantitative methods, breadth of education, and experiences that demonstrate initiative, creativity and interest in compassionate patient care.

For more information about the University of Illinois at Urbana-Champaign MD program, please consult the following websites:
Admissions: http://www.medicine.illinois.edu/admissions
Financial Aid: http://www.medicine.illinois.edu/finaid
MD Program: http://www.medicine.illinois.edu/prospective_students/

Admission criteria for the MS in Translational Medical Sciences are different than for the MD degree program. For more information about this Master of Science degree program, please visit medicine.illinois.edu.

Degree Requirements – MS in Translational Medical Sciences

*For additional details and requirements for all degrees, please refer to the Graduate College Handbook.

Master of Science in Translational Medical Sciences

BSE 612	Foundational Elements	10
BSE 621	Clinical Immersion	2
BSE 622	Translational Medical Sciences I	4
BSE 623	Translational Medical Sciences II	4
BSE 624	Clinical Capstone Project I	4
BSE 625	Clinical Capstone Project II	4
Technical Electives[1]		8
Total Hours		**36**

[1]Courses from approved list/in consultation with academic advisor

Financial Aid

For tuition information regarding the professional and graduate degree programs offered by the Carle Illinois College of Medicine, please visit registrar.illinois.edu. Students in the MS in Translational Medical Sciences degree program are not eligible for tuition waivers through research or teaching assistantships.

CLEARANCES: *(Clearances should include signatures and dates of approval.* ***These signatures must appear on a separate sheet.*** *If multiple departments or colleges are sponsoring the proposal, please add the appropriate signature lines below.)*

Signatures:

Stephen A. Boppart

Unit Representative: Date: March 13, 2019

King Li

College Representative: Date: March 15, 2019

Graduate College Representative: Date: 3/25/19

Council on Teacher Education Representative: Date:

From:	Bagchi, Milan K
To:	Boppart, Stephen Allen
Cc:	Wilson, Brenda Anne; Michael, Melissa
Subject:	Re: CIMED MS TMS Proposal - Revised
Date:	Tuesday, December 3, 2019 5:10:50 PM

Dear Steve:

We greatly appreciate your gesture of sharing with us the revised proposal for the MS degree program in Translational Medical Sciences. We thank you for the care that you took to address our concerns regarding the overlap in the target student population. We believe that you have adequately addressed our concerns.

We support your re-focused proposal and wish you well in your endeavor to get your MS program approved.

All the best,

Milan

Milan K. Bagchi, Ph.D.
Deborah Paul Endowed Professor
Director, School of Molecular and Cellular Biology
University of Illinois at Urbana-Champaign
534 Burrill Hall, 407 South Goodwin
Urbana, IL 61801