

New Proposal

Date Submitted: 04/20/22 3:57 pm

Viewing: : **Engineering: Chemical
Engineering Leadership, MEng**

Last edit: 11/09/22 4:13 pm

Changes proposed by: Keri Pipkins

In Workflow

1. **U Program Review**
2. **1227 Head**
3. **1687 Head**
4. **SOCS Head**
5. **KV Dean**
6. **KP Committee Chair**
7. **KP Dean**
8. **University Librarian**
9. **Grad_College**
10. **Provost**
11. **Senate EPC**
12. Senate
13. U Senate Conf
14. Board of Trustees
15. IBHE
16. HLC
17. DOE
18. DMI

Approval Path

1. 04/20/22 4:00 pm
Emily Stuby
(eastuby):
Approved for U
Program Review
2. 08/19/22 5:25 pm
Keri Pipkins (kcp):
Approved for 1227
Head
3. 08/19/22 5:29 pm
Paul Kenis (kenis):
Approved for 1687
Head
4. 08/19/22 6:22 pm
Karla Denzler
(denzler):
Approved for
SOCS Head
5. 08/22/22 4:03 pm

- Stephen Downie
(sdownie):
Approved for KV
Dean
6. 10/18/22 12:57
pm
Keri Pipkins (kcp):
Approved for KP
Committee Chair
7. 10/18/22 12:58
pm
Cindy Pruitt
(cpruitt):
Approved for KP
Dean
8. 10/18/22 1:06 pm
John Wilkin
(jpwilkin):
Approved for
University
Librarian
9. 11/04/22 1:28 pm
Allison McKinney
(agrindly):
Approved for
Grad_College
10. 11/09/22 3:57 pm
Brooke Newell
(bsnewell):
Rollback to KP
Committee Chair
for Provost
11. 11/09/22 4:05 pm
Keri Pipkins (kcp):
Approved for KP
Committee Chair
12. 11/09/22 4:06 pm
Cindy Pruitt
(cpruitt):
Approved for KP
Dean
13. 11/09/22 4:07 pm
John Wilkin
(jpwilkin):
Approved for
University
Librarian
14. 11/09/22 4:13 pm

Allison McKinney
(agrindly):
Approved for
Grad_College
15. 11/10/22 11:58
am
Brooke Newell
(bsnewell):
Approved for
Provost

Proposal Type

Proposal Type:
Concentration (ex. Dietetics)

Administration Details

Official Program Name	Engineering: Chemical Engineering Leadership, MEng	
Diploma Title	Master of Engineering	
Sponsor College	Grainger College of Engineering	
Sponsor Department	Engineering Administration	
Sponsor Name	Paul Kenis, Professor and Head, Chemical and Biomolecular Engineering	
Sponsor Email	kenis@illinois.edu	
College Contact	Keri Carter Pipkins ENG; Stephen R. Downie LAS	College Contact Email
	kcp@illinois.edu; sdownie@illinois.edu	
College Budget Officer	ENG-Tessa Hile, Assistant Dean for Finance and Administration; LAS-Michael Wellens, Assistant Dean of Finance and Resource Planning	
College Budget Officer Email	tmhile@illinois.edu; wellens@illinois.edu	

List the role for rollbacks (which role will edit the proposal on questions from EPC, e.g., Dept Head or Initiator) and/or any additional stakeholders. Purpose: List here who will do the editing work if proposal needs rolled back. And any other stakeholders.

Paul Kenis, kenis@illinois.edu; Hong Yang (Program Director), hy66@illinois.edu

Does this program have inter-departmental administration?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

Please describe the oversight/governance for this program, e.g., traditional departmental/college governance. Inclusion of/roles of elected faculty committees? Inclusion of/roles of any advisory committees.

This proposed concentration in Chemical Engineering Leadership will fall under the umbrella MEng program in The Grainger College of Engineering. Within the Department of Chemical and Biomolecular Engineering, a dedicated professional graduate program committee will oversee the concentration in Chemical Engineering Leadership.

College Liberal Arts & Sciences
Department Chemical and Biomolecular Engineering
Is there an additional department involved in governance?
No

Proposal Title

Effective Catalog Fall 2023
Term

Proposal Title (either Establish/Revise/Eliminate the Degree Name in Program Name in the College of XXXX, i.e., Establish the Bachelor of Science in Entomology in the College of Liberals Art and Sciences, include the Graduate College for Grad Programs)

Establish a concentration in Chemical Engineering Leadership in the Master of Engineering in Engineering in the Grainger College of Engineering, the College of Liberal Arts and Sciences, and the Graduate College

Does this proposal have any related proposals that will also be revised during the next 6 weeks? Consider Majors, Minors, Concentrations & Joint Programs in your department. Please know that this information is used administratively to move related proposals through workflow efficiently. Example: If you are revising the BS proposal and one related concentration within the next 6 weeks, "This BS proposal (key 567) is related to the Concentration A proposal (key 145)."

no

Program Justification

Provide a brief justification of the program, including highlights of the program objectives, and the careers, occupations, or further educational opportunities for which the program will prepare graduates, when appropriate.

The Department of Chemical and Biomolecular Engineering (ChBE) proposes the development of a Chemical Engineering (ChE) Leadership concentration under the existing Masters of Engineering in Engineering (MEng) umbrella degree program offered by The Grainger College of Engineering (GCOE). For students admitted to this MEng concentration in ChE Leadership who hold a BS in Chemical Engineering, the degree will require 34 credit hours of courses. Students without a Chemical Engineering BS degree need to take three additional core undergraduate level Chemical Engineering courses (11 hrs) to gain the fundamentals necessary to be successful in the MEng program. This ChE Leadership concentration combines a solid chemical engineering technical core and a diverse collection of chemical engineering elective topics, with essential professional development components across a range of topics including financial analysis, leadership, management, and strategic planning to prepare students for the next levels of their careers.

The Chemical Engineering master's program initially will be offered as a concentration under the MEng degree program, which is designed for students whose primary intent is a professional career in industry or government. This degree differs from the Master of Science (MS) degree in that it is a professionally oriented master's degree that is not a pathway to a doctoral program. Once the ChE Leadership (MEng) concentration has proven to be successful after five years, then a proposal will be submitted to establish a stand-alone Master of Engineering in Chemical Engineering degree program under the ChBE department. Program services provided by GCOE under the MEng umbrella will become the responsibility of ChBE after the transition takes place.

The objective of this degree program is to provide a unique learning experience that addresses a void at the intersection of engineering, business management and leadership. Students will learn how the technical knowledge they bring to the table needs to be combined with business knowledge, decision-making skills, and team leadership to deliver successful business opportunities in a rapidly evolving business and technical climate. Industrial organizations need these skill sets for their leaders to succeed in today's volatile, uncertain, complex, and ambiguous business environment. This environment has become so prevalent as industrial leaders have observed the decline of formerly dominant corporations and the surge of new players taking over their markets and industries. The intent of this program is not to cover the broader range of skills associated with an MBA, but to focus on the skills that enable sound business decisions and develop effective leaders.

To gain insight on the potential value of this program and to identify critical skills to be included in the curriculum, interviews were conducted with 28 senior leaders from industries that included energy, consulting, pharmaceuticals, chemicals, and consumer products. The leaders were asked what skills, both leadership and business management, were important in their careers and what they expect to be critical to success in the future. The results of these interviews (see Appendix A) were used to create the program framework and to select courses that deliver the necessary content to develop these skills. The individuals interviewed stressed the need for strong leadership and business management skills to supplement sound technical skills. They

voiced their support for this program and felt that it addressed a critical need for both their companies and the industries.

This program will meet the needs for new skill sets and addresses a specific market - those students with a BS degree in a science or engineering discipline, typically within 5 years of completing their BS degree. We envision the professional and business skills they will acquire through the proposed MEng concentration in ChE will significantly benefit them and their employers throughout their careers. We will graduate alumni whom we can be proud of, and who will be grateful for the unique education we provide to them.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does this new program/proposed change result in the replacement of another program?

No

Does the program include other courses/subjects outside of the sponsoring department impacted by the creation/revision of this program?

Yes

Courses outside
of the sponsoring
department/interdisciplinary
departments

BADM 508 - Leadership and Teams
ACCY 503 - Managerial Accounting
TE 450 - Startups:Inc,Fund,Contracts,IP
TE 460 - Lect in Engrg Entrepreneurship
TE 461 - Technology Entrepreneurship
TE 466 - High-Tech Venture Marketing
TE 565 - Technol Innovation & Strategy

Please attach any [Appendix E_CHBE Concentration_Letters of Support.pdf](#)
letters of [Letter of Support-TEC.pdf](#)
support/acknowledgement
for any
Instructional
Resources
consider faculty,
students, and/or
other impacted
units as
appropriate.

Program Regulation and Assessment

Plan to Assess and Improve Student Learning

Illinois Administrative Code: 1050.30(b)(1)(D) Provision is made for guidance and counseling of students, evaluations of student performance, continuous monitoring of progress of students toward their degree objectives and appropriate academic record keeping.

List the program's student learning outcomes. Each outcome should identify what students are expected to know and/or be able to do upon completing this program.

The objectives of the ChBE Professional MEng program are to:

- Develop advanced engineering skills that apply to the student's area of interest
- Learn how experienced technical leaders and executives apply their skills to solve real-world challenges (context)
- Understand how to identify, define, and deliver high value technical solutions to various stakeholders
- Apply the learned skills through an industrial or research experience
- Become a team leader and a more effective team member of diverse, multi-discipline teams

The assessment of the above-stated objectives will include:

- Feedback from employers, both current employers for part-time students and new employers of full-time students
- Graduate satisfaction surveys
- The job placement of program graduates
- Feedback from sponsor organizations of the capstone projects, both value to the student and to the sponsoring organization

We will conduct exit surveys on all students, which should provide data on graduate students' job placement. On the survey we will design questions to assess student's overall evaluation of these learning objectives. Since the curriculum was developed in close collaboration with industry partners, we expect to maintain close relationship with them and seek their feedback on the quality of our graduates on a regular basis.

Describe how, when, and where these learning outcomes will be assessed.

Describe here:

The unique and key aspects of this program are for students to learn and be capable of integrating engineering, business management and leadership skills to solve high value challenges. The learning objectives for the program will be assessed in the following ways.

- The development of advanced engineering skills will be assessed by successful completion of the graduate level core chemical engineering courses and the technical electives. Students will be advised on the technical elective courses that match their areas of interest to ensure their personal objectives are met.
- Successful completion of the business management and leadership courses provided by Gies College of Business will ensure that the student has gained the necessary knowledge and skills to identify, define, and deliver technical solutions that provide tangible economic and other business value to the organization.
- The program includes two workshops where students meet with industry leaders and executives to learn how technical, business management, and leadership skills are applied to solve real world problems. At the end of each workshop, students must develop plans for how these skills will be applied to their career interests. These plans will be reviewed by the workshop coordinator and facilitators to ensure they incorporate multiple skills and that the student understands how to apply the skills in their career.
- Near the end of the program, each student will have an opportunity to work with an industry or other external organization to solve a high value problem through either a capstone project or an internship. This opportunity is where the student will demonstrate their competence in the skills learned through the course work and also demonstrate their ability to apply a combination of engineering, business management and leadership skills to solve the problem. The final report for either the capstone project or internship must provide tangible evidence of application and integration of multiple skills. Also, the opportunities will be provided for students to work with teams in the respective organizations. The students must demonstrate the ability to work effectively in these organizations. Final reports will be evaluated by the mentor within the sponsoring organization, the course instructor, and the faculty mentor assigned to each student.
- Within the Department of Chemical and Biomolecular Engineering, a program steering committee and an external advisory board will be established to periodically assess the overall effectiveness of the program and recommend improvements to the curriculum. The program steering committee will analyze feedback from students, sponsors of capstone and internships, and faculty members delivering the courses. They also will evaluate job placement data in terms of overall placement and job fit with students' career objectives. The external advisory board, which will consist of alumni and two representatives from other departments, will assess the value of program to industry and adjust learning objectives as needed to improve value.

Identify faculty expectations for students' achievement of each of the stated student learning outcomes. What score, rating, or level of expertise will signify that students have met each outcome? Provide rating rubrics as necessary.

Faculty expectations for the individual courses are defined in syllabus for each of the courses in terms of objectives for that course and how students will be assessed and graded. In terms of the overall program, successful completion of a capstone project or internship as detailed in final report will demonstrate to faculty that the student has achieved the required expertise to apply the required skills to solve a specific problem. Likewise, the skill application plans developed at the end of the workshops will demonstrate that the student understands the practical application of skills and expertise to succeed in their career.

As described above, the program steering committee will be chartered to assess on a periodic basis the achievement of program outcomes and the need to improve the curriculum and/or the overall program objectives.

Explain the process that will be implemented to ensure that assessment results are used to improve student learning.

The assessment of the overall program learning objectives will include:

- Feedback from employers, both current employers for part-time students and new employers of full-time students
- Graduate satisfaction surveys
- The job placement of program graduates
- Feedback from sponsor organizations of the capstone projects, both value to the student and to the sponsoring organization

Exit surveys will be conducted for all students, which should provide data on job placement of graduate students. On the survey, questions will be designed to assess student's overall evaluation of the learning objectives. Since the curriculum is developed in close collaboration with industry partners, the department expects to maintain close relationship with them and seek their feedback on the quality of the graduates on a regular basis.

All data and feedback will be compiled by the program director and coordinator and provided to both the program steering committee and external advisory board which are described in previous sections. Both of these groups will assess the information and provide recommendations for improvements. Implementation of the recommendations will be the responsibility of the program director.

Program
Description and
Requirements
Attach Documents

[Appendix C_CHBE Concentration_Operational Plan and Services.pdf](#)

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: <https://www.ibhe.org/assets/files/PublicAdminRules2017.pdf>). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide

information on how the upper-division hours requirement will be satisfied.

Attach Program of Study-related information such as sample sequences (for undergraduate programs) or college-level forms.

[Appendix A_CHBE Concentration_Catalog Text & Program of Study.pdf](#)
[Appendix D_CHBE Concentration_Course Descriptions.pdf](#)
[Appendix B_CHBE Concentration_Course Sequence.pdf](#)
[RE_CHBE Leadership Concentration Proposal.pdf](#)

Catalog Page Text - Overview Tab

Description of program for the catalog page. This is not official content, it is used to help build the new catalog page for the program. Can be edited in the catalog by the college or department.

associate dean for graduate, professional and online programs: Daniel Bodony
overview of admissions & requirements: <https://grainger.illinois.edu/academics/graduate>
overview of grad college admissions & requirements: <https://grad.illinois.edu/admissions/apply>
college website: <https://grainger.illinois.edu/>
address: 402 Engineering Hall, 1308 W Green St, Urbana, Illinois 61801
phone: (217) 244-2745
email: enr-gpp@illinois.edu

The Grainger College of Engineering offers a Master of Engineering in Engineering (MEng) degree program for students whose primary intent is a professional career in industry or government. This degree differs from the Master of Science (MS) degree in that it is a professionally oriented master's degree that is not a pathway to a doctoral program. The M.Eng. degree requires an interdisciplinary concentration, which must be selected at the time of application.

The Chemical Engineering Leadership MEng degree will be a 34-credit hour program for students with a Chemical Engineering BS degree. Students without a Chemical Engineering BS degree need to take three additional Chemical Engineering core courses (11 hrs) to gain the fundamentals necessary to be successful in the MEng program. This program combines a solid chemical engineering technical core and a diverse collection of chemical engineering electives, with essential professional development components across a range of topics including financial analysis, leadership, management and strategic planning to prepare students for their career development to the next levels.

The curriculum includes two special topic courses which will be held as in-person workshops (Fall and Spring semesters). These workshops will be two-day sessions where students will meet with experienced industry leaders and senior executives from world-class companies and organizations. Through the workshops, students will learn how the skills, processes, and practices presented in the course materials have been successfully applied in a wide variety of real-world roles and situations. Each workshop participant will be expected to develop a personal leadership and development action plan to apply their learnings to their own career objectives.

Admission

Students with bachelor's or master's degrees in engineering or related sciences will be considered for admission if they have a grade point average of at least 3.00 (A = 4.00) for the last two years of undergraduate study. Admission is possible for the both the fall and spring semesters. Full details of admission requirements are on the Web page of the department offering the concentration.

All applicants whose native language is not English are required to submit TOEFL or International English Language Testing System (IELTS) scores as evidence of English proficiency. Minimum admission requirements are set by the Graduate College.

Financial Aid

Students in this concentration under the MEng in Engineering major are not eligible for Board of Trustees (BOT) tuition- waiver generating assistantships at the University of Illinois.

Statement for Programs of Study Catalog

		Course List	
Code	Title		Hours
Technical Core			
			12
<u>CHBE 521</u>	Applied Mathematics in CHBE		
<u>CHBE 523</u>	Heat and Mass Transfer		
or <u>CHBE 513</u>	Advanced Transport Phenomena		
<u>CHBE 551</u>	Chemical Kinetics & Catalysis		
or <u>CHBE 516</u>	Reactor Process Engineering		
Management & Leadership Core			
			10
<u>BADM 508</u>	Leadership and Teams		
<u>ACCY 503</u>	Managerial Accounting		
<u>CHBE 594</u>	Special Topics		
Professional Electives			
			4
Choose from the following:			
<u>ENG 572</u>	Professional Practicum		
<u>ENG 573</u>	Capstone Project		
<u>BADM 544, TE 450, TE 460, TE 461, TE 466, TE 565</u> (Additional courses may count with advisor approval)			
Technical Electives			
			8
Choose from ChBE 400- or 500-level courses in approved Technical Electives list (Up to 4 credit hours of non-ChBE technical elective course credit will be allowed with approval of ChE concentration advisor.)			
<u>CHBE 453, CHBE 471, CHBE 472, CHBE 473, CHBE 475, CHBE 516, CHBE 522, CHBE 525, CHBE 551</u> (if not taken as Core course)			
<u>CHBE 594</u> : Special Topics: Graduate level enriched versions of the following courses:			
<u>CHBE 455, CHBE 458, CHBE 476, CHBE 478</u>			
Total Hours			34

Additional Required Courses for Students without a BS in Chemical Engineering

Course List		
Code	Title	Hours
Technical Core Courses		
		11
<u>CHBE 421</u>	Momentum and Heat Transfer	
<u>CHBE 422</u>	Mass Transfer Operations	
<u>CHBE 424</u>	Chemical Reaction Engineering	

Other Requirements

Course List		
Code	Title	Hours
Minimum 500-level hours required overall:		12
Minimum credit hours taken from the University of Illinois at Urbana-Champaign campus:		20
No courses used to fulfill any degree requirement may be taken using the "Credit/No Credit" option.		

Program Relationships

Corresponding

Program(s):

Corresponding Program(s)

Engineering, MEng

Program Features

Academic Level Graduate

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Additional concentration notes (e.g., estimated enrollment, advising plans, etc.)

For Master of Engineering in Engineering, a concentration is required. Students will be admitted directly to the concentration. This proposal pertains to creating such a concentration in chemical engineering.

Students with bachelor's or master's degrees in engineering or related sciences from a regionally accredited college in the United States or a comparable degree from a recognized institution of higher learning abroad will be considered for admission if they have a grade point average of at least 3.00 (A = 4.00) for the last two years of undergraduate study. Admission is possible for both the fall and spring semesters. All applicants whose native language is not English are required to submit TOEFL or International English Language Testing System (IELTS) scores as evidence of English proficiency.

The Director and Coordinator of the master's program will pre-screen candidates. An admission committee that consists of faculty members teaching the program courses and that is led by a faculty director will screen and admit candidates. Staff members will proceed and work with the Graduate College to finalize admission decisions.

Delivery Method

This program is
available:

On Campus and Online - 2 program types. Students can receive the entire program either on campus or online. Students can choose to take courses in either modality.

Describe the use of this delivery method:

In order to accommodate part-time students who are not resident on campus and are employed full time in industry, the online delivery method will make this program attractive to a wider market. The business development courses offered by the Gies College of Business currently are offered only online.

Enrollment

Number of Students in Program (estimate)

Year One Estimate	10	5th Year Estimate (or when fully implemented)	30
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Budget

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

Yes

Please explain/describe:

Yes, a program director will be hired, whose salary will be covered by the revenue of the program. The ChBE department is on a trajectory of growth of its tenure track and specialized teaching faculty. Current teaching bandwidth plus the added bandwidth through additional hires over the next two years should be ample to cover the teaching needs of this MEng program. Note that the business courses are taught by the Gies College of Business and that several of the ChBE courses will be the same as those already being offered in our current PhD program. We need to increase the frequency of offering for a few of these courses.

Additional Budget Information

Department of Chemical and Biomolecular Engineering will hire a program director who will be part-time initially and then transition to full-time as the program enrollment approaches 30 students. The director will oversee the curriculum and ensure all aspects of the program are of high quality. In addition, the director will serve as a mentor for many of the capstone projects and will organize and facilitate the annual workshops.

A part-time coordinator (0.5 FTE) also will be hired to provide the administrative functions for the program in a manner similar to the current coordinators serving other concentrations in the MEng program. This position also may have other duties within the ChBE department.

Additional TA support will be necessary for some courses, most notably those that are required for all students in this program. This is discussed in more detail below under the Faculty Resources section.

Guest lecturers, capstone mentors, and workshop facilitators will be used on a periodic basis for specific roles in the capstone course and the program workshops. These

individuals will provide the industry perspective and context to the students and will coach them as they complete their capstone projects, and they will be reimbursed for travel expenses and paid a reasonable hourly rate for some of their services.

Attach File(s)

Financial Resources

How does the unit intend to financially support this proposal?

Estimates of tuition revenues and program expenses were prepared for a program enrollment ranging from ten to forty students. Three types of students were considered for the revenue analysis: Illinois resident full-time, Non-Illinois resident full-time, and on-line part-time students. The actual enrollment will be a mixture of the three types, but looking at each type as a separate case gives a high-side, low-side, and a middle case. The enrollment cases are expressed in terms of full-time equivalent (FTE) students. Since many of the on-line students will be part time, two part-time students will be the equivalent of one full-time student, so the actual number of students enrolled in the program may vary depending on the number of part-time students. The all on-line case is a good approximation for tuition revenue of a typical class composition since the average tuition for one Illinois resident and one non-Illinois resident equals approximately the same tuition as an on-line student.

The table attached (Table 1) shows the gross tuition revenue for the three types of students. The tuition distribution to the IVCB expenditure tax, Grainger COE, LAS, Gies COB, and ChBE department is shown only for the on-line student case. Estimated expenses are deducted from the ChBE share of revenue leaving the net revenue to the department.

The graph attached (Table 2) shows the revenue to ChBE for the three types of students and the estimated program expenses for enrollment of 10 to 40 full-time students. It is anticipated that the program revenues will exceed expenses in all cases, even for the ten-student case, and the revenue after expenses to the ChBE department is expected to exceed \$400-\$500k per year when the enrollment reaches or exceeds 30 students (based on the all on-line case).

The allocation methodology for gross tuition revenue was developed specifically for the ChE Leadership concentration since revenue will need to be allocated to LAS, Grainger COE, Gies COB, and the ChBE department, and it is described below:

- All tuition revenue generated will flow to GCOE Administration (1-227) through a unique academic program code assigned to students enrolled in MEng concentration in ChE Leadership.
- GCOE will retain 5% of gross graduate tuition generated under the MEng ChE academic program code to cover administrative costs to support the program under the MEng umbrella.
- GCOE will distribute tuition revenue through standard GCOE graduate tuition sharing policies. The net graduate tuition will be disbursed 60% to academic unit home of major and 40% per graduate instructional unit (IU).
- GCOE will distribute net revenue assigned to ChE for majors and IU's, as well as all other non-GCOE unit IU distribution, to LAS Administration (1-920).
- LAS will distribute net tuition revenue per their graduate tuition sharing policy to ChBE, less any costs to external college units, non-LAS or GCOE. Tuition costs due to MEng ChBE students enrolled in courses offered by Gies College of Business will be one of these costs. Net tuition distribution to ChBE, LAS, and campus are expected to be 67.4%, 7.6%, and 25% respectively.

Estimates of expenses are based on the additional resources required, and they ramp

up as the program enrollment approaches 30 students. Initially, the program will require a moderate level of expenses since it will leverage capacity of existing resources. Details of the anticipated expenses are attached (Table 3) with the basis of each line item. Note that ChBE received an investment for growth (IFG) grant from the campus to help with the development and startup phase of this MEng program.

One Time Costs – Since all of the courses in the program need to be offered on-line, there will be additional costs for ChBE 521, 523, and 551 to develop the on-line lectures and materials. Similar costs will apply to select electives as they are offered as part of the program. These costs can be funded by the existing IFG grant.

Will the unit need to seek campus or other external resources?

No

Attach letters of support [Appendix F Market Research and Financial Resources Updated.pdf](#)

Is this program requesting self-supporting status?

Yes

Faculty Resources

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

The Department of Chemical and Biomolecular Engineering (ChBE) does anticipate some increase in class sizes for the core engineering courses and for some of the elective courses. The main lecture sessions for these courses can accommodate the additional students. However, we do anticipate that new sections will be necessary for some of the required and elective courses. These new sections will be for the professional MEng students so discussions and problems can be tailored for their specific interests and needs. For the core courses of ChBE 521, 523, and 551, one TA will be required for each course for a total of three 25% TAs. For electives, we anticipate that an additional two 25% TAs will be required for the courses with highest enrollment. In addition to the TAs, the professors for these courses will be required to spend additional time delivering material via on-line sessions. The amount of time will vary by the course.

The director of the program may or may not be a faculty member (adjunct/visiting/...). As stated above, this position will be covered by revenue from the program.

The student-to-faculty ratio goal for most engineering programs is 22, where students equal the total of undergraduates plus professional Master's program students, and faculty equals the sum of tenure track and specialized faculty. Presently, ChBE has about 600 undergraduate majors, and zero professional Master's students, for a student-to-faculty ratio of 27. The expectation is that the undergraduate student numbers will reduce to and level of at about 500, while the projected number of students in the ChE MEng Concentration will be 25-30. This would result in a student-to-faculty ratio of about 22. The revenue added by the MEng program will easily exceed the revenue reduction due to the expected drop in undergraduate majors.

Other Staff & Faculty Resources: An operational plan and list of services required to administer the proposed MEng concentration in ChE were developed through a collaborative effort of the faculty and staff of the Graduate, Professional, and Online Programs (GPO) office in the Grainger College of Engineering (GCOE) and the ChBE Department. Appendix C provides a description of services and the organization(s) that will provide these services. GCOE currently provides many services to existing MEng concentrations, and these services will be leveraged by the ChE concentration where similar services do not exist in LAS, School of Chemical Sciences (SCS), or the ChBE department.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

HLC Section

Credit Hours

Existing or repackaged curricula (Courses from existing inventory of courses):	Number of Credit Hours: n/a	n/a Percent of Total:
Revised or redesigned curricula (Courses for which content has been revised for the new program):	Number of Credit Hours: n/a	n/a Percent of Total:
New curricula (Courses developed for the new program that have never been offered):	Number of Credit Hours: n/a	n/a Percent of Total:
Total Credit Hours of the Program: 100	Number of Credit Hours:	34 Percent of Total:

New Faculty Required

Will new faculty expertise or new faculty members be needed to launch this program?

No

Please explain
existing coverage:

n/a

Additional Funds

Will the proposed program require a large outlay of additional funds by the institution?

No

Institutional Funding

Please explain institutional funding for proposed program:

n/a

EP Documentation

EP Control Number EP.23.019

Attach
Rollback/Approval
Notices

This proposal requires HLC inquiry Yes

DMI Documentation

Attach Final
Approval Notices
Banner/Codebook
Name

Program Code:

Minor Code	Conc Code	Degree Code	Major Code
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Senate Approval
Date

Senate
Conference
Approval Date

BOT Approval
Date

IBHE Approval
Date

HLC Approval
Date

DOE Approval
Date

Effective Date:

Attached
Document
Justification for
this request

Program Reviewer
Comments

Deb Forgacs (dforgacs) (04/19/22 9:53 am): Rollback: requested.
Emily Stuby (eastuby) (04/20/22 2:20 pm): Rollback: Update of Sponsor College to align with codebook.
Brooke Newell (bsnewell) (11/04/22 2:24 pm): Per discussion with Keri Carter Pipkins, minor revisions to remove unnecessary, internal College attachments.
Brooke Newell (bsnewell) (11/09/22 3:57 pm): Rollback: Per request of Keri - to add Letter of Support and revise POS accordingly.

Overview

Master of Engineering in Engineering with a concentration in Chemical Engineering Leadership

MEng in Engineering: Concentration in Chemical Engineering Leadership

Overview

associate dean for graduate, professional and online programs: [Daniel Bodony](#)

overview of admissions & requirements: <https://grainger.illinois.edu/academics/graduate>

overview of grad college admissions & requirements: <https://grad.illinois.edu/admissions/apply>

college website: <https://grainger.illinois.edu/>

address: 402 Engineering Hall, 1308 W Green St, Urbana, Illinois 61801

phone: (217) 244-2745

email: enr-gpp@illinois.edu

The Grainger College of Engineering offers a Master of Engineering in Engineering (MEng) degree program for students whose primary intent is a professional career in industry or government. This degree differs from the Master of Science (MS) degree in that it is a professionally oriented master's degree that is not a pathway to a doctoral program. The M.Eng. degree requires an interdisciplinary concentration, which must be selected at the time of application.

The Chemical Engineering Leadership MEng degree will be a 34-credit hour program for students with Chemical Engineering BS. Students without a Chemical Engineering BS degree need to take three additional Chemical Engineering core courses (11 hrs) to gain the fundamentals necessary to be successful in the MEng program. This program combines a solid chemical engineering technical core and a diverse collection of chemical engineering electives, with essential professional development components across a range of topics including financial analysis, leadership, management and strategic planning to prepare students for their career development to the next levels.

The curriculum includes two special topic courses which will be held as in-person workshops (Fall and Spring semesters). These workshops will be two-day sessions where students will meet with experienced industry leaders and senior executives from world-class companies and organizations. Through the workshops, students will learn how the skills, processes, and practices presented in the course materials have been successfully applied in a wide variety of real-world roles and situations. Each workshop participant will be expected to develop a personal leadership and development action plan to apply their learnings to their own career objectives.

Admission

Students with bachelor's or master's degrees in engineering or related sciences will be considered for admission if they have a grade point average of at least 3.00 (A = 4.00) for the last two years of undergraduate study. Admission is possible for the both the fall and spring semesters. Full details of admission requirements are on the Web page of the department offering the concentration.

All applicants whose native language is not English are required to submit TOEFL or International English Language Testing System (IELTS) scores as evidence of English proficiency. Minimum admission requirements are set by the Graduate College.

Financial Aid

Students in concentrations under the MEng in Engineering major are not eligible for Board of Trustees (BOT) tuition- waiver generating assistantships at the University of Illinois

Master of Engineering in Engineering with a concentration in Chemical Engineering Leadership

Degree Requirements Tab

Degree Requirements

Concentration Requirements

Technical Core	12
ChBE 521: Applied Mathematics in ChBE	4
ChBE 523: Heat & Mass Transfer, or ChBE 513: Advanced Transport Phenomena	4
ChBE 551: Chemical Kinetics & Catalysis, or ChBE 516: Reactor Process Engineering	4
Management & Leadership Core	10
BADM 508: Leadership and Teams	4
ACCY 503: Managerial Accounting	4
ChBE 594: ChBE Special Topics – Chemical Eng Leadership (twice for 1 hr)	2
Professional Electives – One of the following (see note)	4
ENG 572: Professional Practicum (ChE section)	4
ENG 573: Capstone Project (ChE section)	4
Four hours from one or more courses in approved Professional Electives list	4
Technical Electives	8
Choose from ChBE 400- or 500-level courses in approved Technical Electives list (up to 4 credit hours outside ChBE allowed)	
Total Coursework Hours	34

Note: Students will be encouraged to take either ENG 572 or ENG 573 to apply the skills that they have gained in the program to an opportunity provided by a sponsor organization or an employer. If this is not feasible and with the approval of the ChE concentration advisor, students can take additional courses as listed.

Approved Professional Electives:	
BADM 544 Strategic Management	2 or 4
TE 450 Startups: Incorporation, Funding, Contracts, & IP	3
TE 460 Lectures in Engineering Entrepreneurship	1
TE 461 Technology Entrepreneurship	3
TE 466 High-Tech Venture Marketing	2
TE 560 Managing Advanced Technology	1
TE 565 Technology Innovation & Strategy	2
Additional courses may count with advisor approval	

Approved Technical Electives:	
CHBE 453: Electrochemical Engineering	3 or 4
CHBE 471: Biochemical Engineering	3 or 4
CHBE 472: Techniques in Biomolecular Engineering	3 or 4
CHBE 473: Biomolecular Engineering	3 or 4
CHBE 475: Tissue Engineering	3 or 4
CHBE 516: Reactor Process Engineering (if not takes as Core course)	4
CHBE 522: Fluid Dynamics	4
CHBE 525: Statistical Thermodynamics for Chemical Engineers	4
CHBE 551: Chemical Kinetics & Catalysis (if not taken as Core course)	4
CHBE 594: Special Topics:	
Graduate level enriched versions of the following courses:	

CHBE 455: Polymers Synthesis and Industrial Applications	4
CHBE 458: Synthetic Nanomaterials	4
CHBE 476: Biotransport	4
CHBE 478: Bioenergy Technology	4
Up to 4 credit hours of non-ChBE technical elective course credit will be allowed with approval of ChE concentration advisor.	

Additional Required Courses for Students without a BS in Chemical Engineering

Technical Core Courses	11
ChBE 421 Momentum and Heat Transfer	4
ChBE 422 Mass Transfer Operations	4
ChBE 424 Chemical Reaction Engineering	3

Other Requirements and Conditions (may overlap)

A minimum of 20 credit hrs must be taken from the University of Illinois Urbana-Champaign campus.
A minimum of 12 500-level credit hours.
No courses used to fulfill any degree requirement may be taken using the "Credit/No Credit" option.

Master of Engineering in Engineering with a concentration in Chemical Engineering Leadership

APPENDIX B – COURSE SEQUENCE

A possible course sequence is shown below for both full-time students and part-time students. Of course, other options are envisioned to meet the schedule and needs of individual students, but this sequence was developed to illustrate that a full-time student could complete the program in one calendar year, and a part-time student could complete it in two-years.

MEng ChE Leadership Concentration - Typical Course Sequence

Semester	Full-Time Student		Part-Time Student	
	Course	Hrs	Course	Hrs
Fall	ChBE 521 - Applied Mathematics in ChBE	4	ChBE 521 - Applied Mathematics in ChBE	4
	BADM 508 - Everyday Leadership	4	BADM 508 - Everyday Leadership	4
	ChBE 551 - Chemical Kinetics & Catalysis	4		
	ChBE 594 - Special Topics - Leadership	1	Semester Total	8
	Semester Total	13		
Spring	ChBE 523 - Heat and Mass Transfer	4	ChBE 523 - Heat and Mass Transfer	4
	Technical Elective	4	ACCY 503 - Managerial Accounting	4
	ACCY 503 - Managerial Accounting	4	ChBE 594 - Special Topics - Leadership	1
	ChBE 594 - Special Topics - Leadership	1	Semester Total	9
	Semester Total	13		
Summer	ENG 572/573 - Practicum/Capstone	4	Technical Elective	4
	Technical Elective	4	Semester Total	4
	Semester Total	8		
Fall			ChBE 551 - Chemical Kinetics & Catalysis	4
			Technical Elective	4
			ChBE 594 - Special Topics - Leadership	1
		Semester Total	9	
Spring			ENG 572/573 - Practicum/Capstone	4
			Semester Total	4
	Degree Total	34	Degree Total	34

MEng ChE Leadership Concentration - Course Sequence Options for Non-ChBE Degrees

Two On-Campus Semesters Required Followed by On-Campus or Online

Semester	Fall Enrollment		Spring Enrollment	
	Course	Hrs	Course	Hrs
Fall	ChBE 421 - Momentum & Heat Transfer	4		
	Technical Elective	4		
	BADM 508 - Everyday Leadership	4		
	ChBE 594 - Special Topics - Leadership	1		
	MEng Semester Total	9		
	Semester Total	13		
	On-Campus Only			
Spring	ChBE 422 - Mass Transfer Operations	4	ChBE 421 - Momentum & Heat Transfer	4
	ChBE 424 - Chemical Reaction Engineering	3	Technical Elective	4
	ACCY 503 - Managerial Accounting	4	ACCY 503 - Managerial Accounting	4
	ChBE 594 - Special Topics - Leadership	1	ChBE 594 - Special Topics - Leadership	1
	MEng Semester Total	5	MEng Semester Total	9
	Semester Total	12	Semester Total	13
	On-Campus Only		On-Campus Only	
Summer				
Fall	ChBE 521 - Applied Mathematics in ChBE	4	ChBE 422 - Mass Transfer Operations	4
	ChBE 551 - Chemical Kinetics & Catalysis	4	ChBE 424 - Chemical Reaction Engineering	3
	Technical Elective	4	ChBE 521 - Applied Mathematics in ChBE	4
	Semester Total	12	MEng Semester Total	4
			Semester Total	11
	On-Campus Only		On-Campus Only	
Spring	ChBE 513 - Advanced Transport Phenomena	4	ChBE 513 - Advanced Transport Phenomena	4
	ENG 572/573 - Practicum/Capstone	4	ChBE 551 - Chemical Kinetics & Catalysis	4
	Semester Total	8	Technical Elective	4
			Semester Total	12
Summer				
Fall			BADM 508 - Everyday Leadership	4
			ChBE 594 - Special Topics - Leadership	1
			ENG 572/573 - Practicum/Capstone	4
			Semester Total	9
	Degree Total	34	Degree Total	34
	Total with Recommended Fundamentals	45	Total with Recommended Fundamentals	45

Red font courses are recommended fundamentals for non-ChE degrees to ensure success in MEng program
Students must be resident on-campus because the fundamentals courses are not offered on-line

APPENDIX C – OPERATIONAL PLAN AND SERVICES

The operational plan and list of required services were developed through a collaborative effort of the faculty and staff of the Graduate, Professional, and Online Programs (GPO) office in the Grainger College of Engineering (GCOE) and the ChBE Department. The plan and services have been reviewed by the Associate Dean of GPO.

Program Proposal Support and Guidance

- Initial proposal drafted by ChBE and submitted to LAS Interim Associate Dean for Curricula and Academic Policy for approval
- Interim Associate Dean for Curricula and Academic Policy to enter into CIM, coordinate LAS approvals, and route to GCOE for further processing
- GCOE GPO to review proposal to ensure it meets GCOE requirements, and develops required workflow
- GCOE GPO will track progress and arrange review/approval meetings per workflow
- ChBE will provide additional information and revisions during the approval process

Program Director

- ChBE will name a Program Director who will be part-time for the first 1-2 years and then full-time as the work load increases
- In addition to the role as defined by GPO for other concentrations, the ChBE Program Director responsibilities will include curriculum, academic advising, capstone project solicitation, capstone/practicum mentoring, and workshop development

Program Coordinator

- ChBE will name a part-time Program Coordinator
- Program Coordinator roles will be essentially the same as other concentrations, but adjusted to meet ChBE specific needs
- Training and ongoing support to be provided by GCOE GPO
- ChBE Coordinator will become a member of the GPO program coordinators groups and will attend monthly meetings

Marketing and Website Development

- To be led by ChBE Associate Director of Communications
- Support provided by GCOE for marketing plan development and development of the ChBE section of the MEng website using same format as other concentrations
- ChBE will leverage industry contacts from the corporate relations offices in both LAS and GCOE and alumni contacts from the ChBE Associate Director of Development to solicit engagement of industry in promoting enrollment for their employees and co-workers

Recruiting

- Leverage current processes in ChBE and GCOE to recruit program candidates, including attending professional meetings, grad school fairs, and other events

Admissions

- As required by the MEng policies, a separate committee will be established in ChBE to manage admissions
- Applications will be submitted through the Graduate College. The Program Coordinator will process applications and forward to the ChE admissions committee for evaluation
- The program coordinator will communicate with prospective and current applicants. GPO staff assist with general communications and directing applicants to appropriate departments.

Curriculum and Program Evaluation

- The current ChBE MEng program committee will handle curriculum and program evaluation
- As required by the MEng policies, the evaluation must be performed annually
- If the program is successful, GPO will assist ChBE in drafting a program proposal to transition to a stand-alone degree program (e.g. Major) housed within the department.

Academic Advising & Career Services and Professional Development

- Initially, academic advising to be performed by the Program Director, and will become a shared responsibility with other faculty members as enrollment grows
- The existing School of Chemical Sciences Office of Academic Advising and Career Services will handle career services; students also may utilize Engineering Career Services
- ENG 591: Professional Seminar Series is a 0 credit hour course available to M.Eng. students. Students who are not registered also may attend sessions that interest them. This course is facilitated by GPO staff. Topics include some career planning (led by Engineering Career Services or alumni) as well as tech. talks and professional advice from alumni and corporate partners.
- Occasional workshops, events, and/or community-building activities may be planned for all M.Eng. students.

Access to ENG 572 & 573

- ENG 572: Professional Practice is a course for students have identified an internship and would like to receive academic credit (with department approval)
- ENG 573: Capstone Project is the Capstone Project course. Students may do faculty sponsored Capstone projects or industry sponsored capstone projects – this is up to each department.
- GPO sets up separate section for ChBE in the course schedule, provides sample syllabi, and provided the necessary agreements that are signed by the student and sponsoring organizations
- ChBE provides an instructor for the section, develops course syllabi, and assigns mentors to each student

Industry Sponsored Capstone Solicitation / Coordination

- Overall project solicitation and coordination to be the responsibility of the Program Director
- Leverage industry contacts from the corporate relations offices in LAS and GCOE and alumni contacts from the ChBE Associate Director of Development to identify capstone projects
- Collaborate with GCOE Professional Programs Coordinator to share industry contacts and to identify potential projects for ChBE and for other concentrations
- ChBE solicits participation from industry partners and connects interested parties with the Professional Programs Coordinator in GPO, who will ensure all contracts and agreements are current and signed (Master Contract b/t company and university, Project Agreement b/t company contact/project mentor and instructor, student agreement signed by each student.

Access to ENG 510

- Course available to all GCOE international students who are required to be enrolled in a course during the term they complete CPT (Curricular Practical Training)

Workshop Development and Coordination

- Workshop content, speakers, course syllabi, and agenda to be developed by Program Director
- Logistics, venue, and other administrative duties for the workshops to be handled by Program Coordinator

Online Program Development and Delivery

- Faculty are responsible for developing the online content for courses that they teach
- Utilize services of GPO's Online Programs Team to develop high quality content delivered using best technologies. Level of services may vary depending on the number of online students and the preferences of the faculty. Also, the level of services likely will increase as overall program enrollment increases. Services may include:
 - Course set up in Banner and registration,
 - Course/lecture capture,
 - Proctoring of exams,
 - Customer service for students, faculty, and staff.

Degree Conferral

- Same as current process used by ChE for BS and PhD degrees

Student Concerns / Well-Being

- Plan to leverage existing processes and services available in ChBE, SCS, GPO in GCOE, and on campus

Workshops for the Chemical Engineering Master's Program

The unique feature of the chemical engineering master's program will be two in-person workshops where participant will assemble in Chicago for a two-day session and will meet with experienced industry leaders and senior executives from world-class companies and organizations. One workshop will be offered in the Fall and Spring semesters, and each workshop will be a separate section of ChBE 594 – Special Topics. Each of the two workshops will be for one credit hour.

Leadership, business management, and engineering skills only contribute to value when they are applied to real-world challenges and opportunities. Through the workshops, program participants will learn how the skills, processes, and practices presented in the course material have been successfully applied in a wide variety of roles and situations. In addition, participants will share their personal experiences in smaller break-out sessions, and how what they have learned can be applied to their current work or study opportunities.

Each workshop participant will be expected to develop a personal leadership and development action plan to apply their learnings to their own career objectives. This plan will include immediate actions (what can I apply tomorrow), near-term and long-term actions. Unless skills are exercised and applied to personal situations in an ongoing manner, they will be lost or their value will be significantly diminished.

Workshop Objectives

- **Application** – See how the concepts learned in the course materials are applied to opportunities in industry and research
- **Integration** – Understand how engineering, business management, and leadership skills are integrated to deliver high value solutions
- **Networking** – Develop relationship with classmates, alumni, and industry leaders. Learn from the diverse viewpoints and experiences of all participants.
- **Personal development** – Prepare a personal development plan to incorporate the skills learned into current work, academic and personal growth opportunities

Workshop Format

- A. **Review of key concepts** – Highlights of the “critical few” concepts and principles that will underpin the discussions and teachings of the workshop
- B. **Case studies** – Analyze one or two case studies and relate them back to the key principles
- C. **Industry examples / Guest speakers** – Hear from industry leaders and alumni as to how they have applied the concepts and principles to opportunities in their career.
- D. **Class challenge** – Work in small teams to analyze a challenge provided by one of the guest speakers.

- E. **Personal implementation plan** – Develop a plan to apply what was learned in the workshop to current growth opportunities. Focus should be on what can be implemented immediately to begin the skill development process.

Workshop #1 – Leading High Value Teams

- A. Review of key concepts
- Traits that make great team members are also characteristics of great team leaders.
 - The importance of helping the team understand how their work fits into the bigger picture
 - Leading vertically and horizontally in a multi-functional organization or across multiple organizations
 - Leveraging diverse cultures, skills, and viewpoints to maximize results
- B. Case study
- Example of a team or organization that was transformed by an effective leader
 - Managing teams across multiple cultures and geographic locations
- C. Industry examples / guest speakers
- Leading a step change or significant improvement in team's or organization's performance
 - Why diversity and inclusion are business imperatives in today's global business environment
- D. Class challenge
- Correlate the "self as leader" skills and capabilities to the characteristics of high performing teams.
 - From the case studies and industry examples, identify the leadership behaviors that drove team performance.
- E. Personal implementation plan
- What are the top 3 key learnings from this workshop?
 - How do the workshop learnings link to personal insights gained from "self as leader"?
 - How will you apply them to your current work, research, or studies?

Workshop #2 – Defining & Communicating Value

- A. Review of key concepts
- Financial and non-financial metrics that define the value of an opportunity
 - The importance of understanding the value chain and impacts/contributions along the full chain
 - Vertical and horizontal integration within an organization and outside the organization, and the impact on value delivery
 - Understanding the value proposition to all stakeholders
 - Communicating the value message to a wide range of audiences and stakeholders

B. Case study

- Example of an integrated business that identifies and realizes more value across the value chain than their competitors
- Understand how the value was communicated to others to enlist their participation and contribution to optimize overall value

C. Industry examples / guest speakers

- Maximizing value across a large multi-sector value chain
- Avoiding value leakage between functions within an organization
- Communicating from operators to CEOs and to investors/shareholders

D. Class challenge

- From the case studies and industry examples, identify the value captured along each part of the value chain.

E. Personal implementation plan

- What are the top 3 key learnings from this workshop?
- How will you apply them to your current work, research, or studies?

APPENDIX D – COURSE DESCRIPTIONS

Core Courses

CHBE 513 Advanced Transport Phenomena credit: 4 Hours

The advanced analysis of transport phenomena is a prerequisite to analyzing physical phenomena in a broad range of chemical engineering processes and applications. Topics include governing equations, mathematical analyses, essential mechanisms of conduction, diffusion and convective transport, hydrodynamic stability, and the interaction of mass transfer with reactions. This course is an alternative to CHBE 523, with the added coverage of momentum transport. Course Information: 4 graduate hours. 4 professional hours. Prerequisite: CHBE 521 and CHBE 421; or 400 level course in transport phenomena; or consent of instructor.

CHBE 516 Reactor Process Engineering credit: 4 Hours

Through a series of lectures centered around the study of chemical reactions, we will explore how thermodynamics, fluids mechanics, and kinetic principles impact the energy and mass balance of specific processes. Theoretical derivation describing chemical processes will be completed with simulation-based processes using commercial packages. Ultimately the students will learn to converge all the core scientific principles that are characteristic of the chemical engineering curriculum (Thermodynamics, Kinetics, Fluid Mechanics). Prerequisite: Courses in mathematics application in engineering, thermodynamics, reactor engineering, heat transfer and process control, such as CHBE424, CHBE321, CHBE 421, CHBE 440, MATH 284 or MATH 285 or MATH 286, or comparable level courses in other disciplines (consent of instructor required)

CHBE 521 Applied Mathematics in CHBE credit: 4 Hours

Development of mathematical models and a survey of modern mathematical methods currently used in the solution of chemical and biomolecular engineering problems; topics include the application of vectors and matrices, partial differential equations, numerical analysis, and methods of optimization in Chemical and Biomolecular Engineering. Prerequisite: Consent of instructor.

CHBE 523 Heat and Mass Transfer credit: 4 Hours

Principles of transfer operations developed in terms of physical rate processes; boundary layer heat and mass transfer, phase changes, and separation processes. Prerequisite: Consent of instructor.

CHBE 551 Chemical Kinetics and Catalysis credit: 4 Hours

Rates and mechanisms of chemical reactions, treatment of data, steady state and unsteady behavior predictions of mechanisms, prediction of rate constants and activation barriers. Introduction to catalysis. Catalysis by solvents, metals, organometallics, acids, enzymes, semiconductors. Same as CHEM 582. Prerequisite: An undergraduate course in chemical kinetics.

CHBE 594 Special Topics credit: 1-4 Hours

Various advanced topics; generally taken during the second year of graduate study. Typical topics include turbulence, hydrodynamic instability, process dynamics, interfacial phenomena, reactor design, cellular bioengineering, properties of matter at high pressure, and phase transitions. May be repeated. Prerequisite: Consent of instructor.

BADM 508 Everyday Leadership credit: 4 Hours

Develops and integrates fundamental behavioral concepts and theory having administrative applications; initially focuses on the individual decision maker and ultimately includes interpersonal, organizational, and social structures and influences; and develops strategies and methods of research on behavioral applications in business.

ACCY 503 Managerial Accounting credit: 4 Hours

Introduction to management accounting principles, as used to facilitate and align internal decisions made by managers and employees. Topics include analytical tools and techniques to address common business problems, cost information systems, budgeting, and strategic performance measurement systems. 2 or 4 graduate hours. No professional credit. May be repeated up to 4 hours for iMSA and online students that complete the first part of the course content in a 2-hour section (part A) and then complete the remainder of the class in a second 2-hour section (part B). Prerequisite: Credit or concurrent registration in ACCY 501 or equivalent; enrollment in graduate degree program or consent of department.

ENG 572 Professional Practicum credit: 4 Hours

Internship or equivalent experience as it relates to the student's field of study. Student will complete a comprehensive written report, develop a website, and/or give an oral presentation that relates to his/her internship experience.

ENG 573 Capstone Project credit: 4 Hours

Design project pertinent to student's field of study. Student will complete a comprehensive written report, develop a website, and/or give an oral presentation that relates to his/her project.

Technical Electives

CHBE 453 Electrochemical Engineering credit: 2 or 3 Hours.

Fundamentals of analysis, design, and optimization of electrochemical systems. 2 or 3 undergraduate hours. 2 or 3 graduate hours. Prerequisite: Senior standing in physical science or engineering.

CHBE 471 Biochemical Engineering credit: 3 or 4 Hours.

Applications of chemical engineering principles to biological processes. Topics include enzyme mechanisms and kinetics, bioreactor design, cellular growth and metabolism, fermentation, and bioseparations. 3 undergraduate hours. 4 graduate hours. Prerequisite: Junior, senior, or graduate standing, or consent of instructor.

CHBE 472 Techniques in Biomolecular Eng credit: 3 or 4 Hours.

Engineering principles that underlie many of the powerful tools in biotechnology and how scientific discoveries and engineering approaches are used in current industrial applications. Physical principles that govern self-organization and repair in biological systems; tools developed to characterize, manipulate, and quantify biomolecules; use of analytical tools and genetic manipulation in modern bioengineering and biotechnology applications. 3 undergraduate hours. 4 graduate hours. Prerequisite: CHEM 202, CHEM 203, CHEM 204 or equivalent; MATH 220 or MATH 221; PHYS 211, PHYS 214 or equivalent; MCB 450.

CHBE 473 Biomolecular Engineering credit: 3 or 4 Hours.

Fundamental principles of biomolecular engineering and its applications in pharmaceutical, agriculture, chemical and food industries. Topics include gene discovery, rational design, directed evolution, pathway engineering, and functional genomics and proteomics. 3 undergraduate hours. 4 graduate hours.

CHBE 475 Tissue Engineering credit: 3 Hours.

Principles and practices of Chemical Engineering will be applied to the topic of tissue engineering. Topics include: methods for employing selected cells, biomaterial scaffolds, soluble regulators or their genes, and mechanical loading and culture conditions for regenerative repair of tissues and organs in vitro and in vivo; understanding intrinsic wound healing processes; quantifying cell behaviors/phenotypes; regulatory compliance and clinical translation. 3 undergraduate hours. 3 graduate hours. Prerequisites: CHBE 421 and CHBE 422, or consent of instructor.

CHBE 522 Fluid Dynamics credit: 4 Hours.

Basic concepts in fluid dynamics with special emphasis on topics of interest to chemical and biomolecular engineers. Derivation of the Navier-Stokes equations; solutions for creeping flow, perfect fluids, and boundary layers; non-Newtonian fluids; turbulence. Prerequisite: Consent of instructor.

CHBE 525 Statistical Thermodynamics for Chemical Engineers credit: 4 Hours.

Fundamentals and applications of both macroscopic thermodynamics and statistical mechanics. The formalism of statistical mechanics is introduced, in particular the development and calculation of partition functions, as well as its connections to thermodynamic equations of state and material properties. These concepts will be applied to problems relevant to chemical engineering, such as solution theory, electrolytes, adsorption, non-equilibrium thermodynamics, chemical reactions, molecular simulation, and dispersive interactions. 3 graduate hours. No professional credit. Prerequisite: CHBE 321. Graduate standing required.

CHBE 594 Special Topics credit: 1 to 4 Hours.

Various advanced topics; generally taken during the second year of graduate study. Typical topics include turbulence, hydrodynamic instability, process dynamics, interfacial phenomena, reactor design, cellular bioengineering, properties of matter at high pressure, and phase transitions. May be repeated. Prerequisite: Consent of instructor.

NOTE: CHBE 594 Special Topics courses are often offered as enriched version of 400 level electives with shared lecture times and additional material or requirements through additional readings or semester special projects. Courses with CHBE 594 offerings have included CHBE 455, 458, 476 and 478 described below.

CHBE 455 Polymers Synthesis and Industrial Applications credit: 3 Hours.

Explores the fundamentals of polymer production by providing a broad overview of several topics within the field. Students will gain an appreciation of the relationships between polymer composition, synthesis, and processing, all of which ultimately determine bulk polymer properties. 3 undergraduate hours. No graduate credit. Credit is not given for both CHBE 455 and MSE 457.

CHBE 458 Synthetic Nanomaterials credit: 3 Hours.

Study of the concepts related to the fundamentals and practical methods for the preparation of nanostructured materials. Classical nucleation and growth, interfacial science, crystal structures, and characterization techniques are among some of the topics covered. The emphasis will be placed on the processing controls of size, shape (dot, wire, and two-dimensional materials), facet, composition, and hierarchical structure. Students will also be exposed to related current topics, including the applications of nanoparticles in energy, sustainability, and biotechnology. 3 undergraduate hours. No graduate credit. Prerequisite: CHEM 102 and CHEM 104 or equivalents.

CHBE 476 Biotransport credit: 3 Hours.

Investigates the critical roles the transports of mass, energy and momentum play in the function of living systems at varied levels (e.g., cells, tissues, and organs) and time scales. Transport phenomena are also central to the design and operation of devices for biological research, imaging, biochemical processes, and therapeutic interventions including drug delivery, gene therapy and tissue engineering. Students will explore conservation laws of mass, energy, and momentum to mathematically describe cell and molecular biology, immunology, physiology and biomedical engineering systems. 3 undergraduate hours. No graduate credit. Prerequisites: CHBE 421 and CHBE 422 or consent of instructor.

CHBE 478 Bioenergy Technology credit: 3 Hours.

Introduction to emerging bioenergy technologies including: world energy consumption and greenhouse gas concerns; fundamental biochemistry of biomass conversion; structural chemistry of lignocelluloses; pretreatment of biomass; enzymatic deconstruction; bioethanol production and fermentation; metabolic engineering for improved biofuels production; feedstock development; industrial fermentation and fermentor design; economics of bioethanol; alternative biofuels, including biodiesel, syngas, Fischer-Tropsch diesel, butanol, ABE fermentation and biohydrogen; anaerobic microbiology; and the biorefinery concept. 3 undergraduate hours. No graduate credit. Prerequisites: CHBE 321; MCB 450.

BADM 544 Strategic Management credit: 2 or 4 Hours

An integrative examination of executive-level decisions and policies that drive company survival and performance. Combines theoretical and practical learning through strategic management tools, frameworks, examples and case studies. Provides a top management view of companies and organizations that is essential learning for any leader. 2 or 4 graduate hours. No professional credit. Credit is not given for both BADM 544 and BADM 339. Prerequisite: BADM 509, BADM 520, and BADM 567, FIN 520, or equivalent.

Professional Electives

TE 450 Startups: Incorporation, Funding, Contracts, & Intellectual Property credit: 3 Hours

Explores how legal tools may be used in the construction and successful operation of your company to deliver the next great product to market. Topics covered in the class include: issues with business formation, funding, intellectual property, non-disclosure agreements, contracts, and other corporate legal issues particularly impacting startups. 3 undergraduate hours. 3 graduate hours.

TE 460 Lectures in Engineering Entrepreneurship credit: 1 Hour.

Fundamental concepts of entrepreneurship and commercialization of new technology in new and existing engineering and high-tech businesses. Guest speaker topics vary, but typically include: evaluation of technologies and business ideas in general; commercializing new technologies; financing

through private and public sources; legal issues; product development; marketing; international business issues. 1 undergraduate hour. 1 graduate hour. May be repeated in separate terms to a maximum of 2 hours, if topics vary; instructor approval required. Credit is not given for both TE 360 and TE 460.

TE 461 Technology Entrepreneurship credit: 3 Hours.

Critical factors affecting technology-based ventures: opportunity assessment; the entrepreneurial process; founders and team building; preparation of a business plan including market research, marketing and sales, finance, and manufacturing considerations. Students must have an idea for a new venture to participate in the course, and must be prepared to develop this new venture idea as part of the course. 3 undergraduate hours. 3 graduate hours.

TE 466 High-Tech Venture Marketing credit: 2 Hours.

Cornerstone marketing concepts for innovators and engineers to enable analysis of products and technologies from a marketing perspective: engineering product development and adoption life cycle; objectives and strategies; marketing management; communication skills; sales process and tactics; special considerations for new high-tech engineering products and innovations. 2 undergraduate hours. 2 graduate hours. Credit is not given for both TE 466 and BADM 365.

TE 560 Managing Advanced Technol I credit: 1 Hour.

Business perspective of managing advanced technology in industry: strategic context of advanced technology; analytical financial tools used to estimate its potential value; legal concepts important in its management; interpersonal issues related to leading and advocating on behalf of advanced technology groups. 1 graduate hour. No professional credit.

TE 565 Technol Innovation & Strategy credit: 2 Hours.

Concepts and frameworks for analyzing how firms can create, commercialize and capture value from technology-based products and services. Business, commercialization, and management aspects of technology. Emphasis on reasons that existing firms or startups which have successfully commercialized products or services fail to sustain their success as technology changes and evolves. 2 graduate hours. No professional credit.

Appendix E: Letters of Support from Colleges & Academic Units

1. Gies College of Business
2. Aerospace Engineering
3. Agricultural and Biological Engineering
4. Bioengineering
5. Civil and Environmental Engineering
6. Chemistry
7. Computer Science
8. Electrical & Computer Engineering
9. Industrial & Enterprise Systems Engineering
10. Materials Science and Engineering
11. Mechanical Engineering
12. Molecular & Cellular Biology
13. Nuclear, Plasma, and Radiological Engineering
14. Physics
15. Grainger College of Engineering

APPENDIX E –LETTERS OF SUPPORT

I ILLINOIS
Gies College of Business

IMBA Online Programs
2302 Fox Drive, Suite D
Champaign, IL 61820

TO: Paul J.A. Kenis, PhD
Elio E. Tarika Endowed Chair
Professor and Department Head
Chemical & Biomolecular Engineering

FROM: W. Brooke Elliott
Associate Dean and EY Professor
Gies College of Business

DATE: October 26, 2021

RE: Gies Business Online courses, BADM 508, BADM 544, and ACCY 503 as part of
Master of Engineering in Engineering (MEng) with a concentration in Chemical Engineering

The Gies College of Business supports the efforts of the Department of Chemical and Biomolecular Engineering to develop a Master of Engineering in Engineering (MEng) with a concentration in Chemical Engineering. As part of the professional development requirements of this new MEng concentration, Gies Business supports including BADM 508, BADM 544, and ACCY 503 as part of the curriculum recognizing that the inclusion of business coursework will provide graduates from this program a foundation in essential business topics that will complement their technical expertise and be attractive to employers.

Gies Business will allow these Chemical Engineering MEng students to enroll in these courses with the consent of the department or by modifying the current enrollment restrictions. Gies Business understands that the initial enrollment will be approximately ten students beginning in AY22-23 and is projected to increase to approximately 30 over a three to five year period. All tuition for these MENG students taking the aforementioned Gies Business courses will be allocated directly to Gies College of Business.

If you have any questions, please let me know.



W. Brooke Elliott
Associate Dean and EY Professor
Gies College of Business



THE GRAINGER COLLEGE OF ENGINEERING

Department of Aerospace Engineering
306 Talbot Laboratory, MC-236
104 S. Wright St.
Urbana, IL 61801

April 27, 2022

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Aerospace Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,

A handwritten signature in blue ink that reads "Jonathan B. Freund". The signature is written in a cursive style with a large, stylized 'J' and 'F'.

Jonathan Freund
Willett Professor and Head



**COLLEGE OF AGRICULTURAL, CONSUMER
& ENVIRONMENTAL SCIENCES**
THE GRAINGER COLLEGE OF ENGINEERING

Department of Agricultural & Biological Engineering
338 Agricultural Engineering Sciences Building, MC-644
1304 W. Pennsylvania Ave.
Urbana, IL 61801

March 8, 2022

Paul J.A. Kenis
Elio E. Tarika Chair and Head
Department of Chemical and Biomolecular Engineering

Dear Professor Kenis:

We understand that the Department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Agricultural and Biological Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. Maghirang', written over a white oval background.

Ronaldo G. Maghirang
Professor and Head



THE GRAINGER COLLEGE OF ENGINEERING

Department of Bioengineering
1102 Everitt Laboratory, MC-278
1406 W. Green St.
Urbana, IL 61801

March 11, 2022

Professor Paul Kenis
Elio E. Tarika Chair and Head
Department of Chemical and Biomolecular Engineering

Dear Paul,

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Bioengineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Congratulations on your exciting proposal!

A handwritten signature in black ink that reads 'Mark Anastasio'.

Mark A. Anastasio, Ph.D.
Donald Biggar Willett Professor in Engineering
Head, Dept. of Bioengineering,
University of Illinois at Urbana-Champaign



THE GRAINGER COLLEGE OF ENGINEERING

Department of Civil & Environmental Engineering
Newmark Civil Engineering Laboratory, MC-250
205 N. Mathews Ave.
Urbana, IL 61801

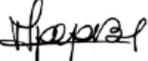
March 8, 2022

Paul Kenis
Elio E. Tarika Chair and Dept Head
Chemical and Biomolecular Engineering

Dear Dr. Kenis,

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Civil and Environmental Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,


Head and Professor
Donald Biggar Willett Chair of Engineering



College of Liberal Arts & Sciences

Department of Chemistry
109 Noyes Laboratory, Box D-1, MC-712
600 S. Mathews Ave.
Urbana, IL 61801-3602

March 9, 2022

Prof. Paul Kenis

Head, Department of Chemical and Biomolecular Engineering

Dear Paul,

We understand that the Department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Chemistry supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella. If you need any more information, do let me know via email, murphycj@illinois.edu.

Best Regards,

A handwritten signature in black ink, appearing to read 'Catherine J. Murphy'.

Catherine J. Murphy
Head, Department of Chemistry
Larry R. Faulkner Endowed Chair in Chemistry



DEPARTMENT OF COMPUTER SCIENCE

Thomas M. Siebel Center for Computer Science
201 N. Goodwin Ave.
Urbana, IL 61801-2302 USA

NANCY M. AMATO

Abel Bliss Professor and Head
2248 Siebel Center
namato@illinois.edu

March 8, 2022

To Whom It May Concern:

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Computer Science supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,

A handwritten signature in black ink that reads 'Nancy Amato'.

Nancy M. Amato
Abel Bliss Professor and Head
Department of Computer Science



THE GRAINGER COLLEGE OF ENGINEERING

Department of Electrical & Computer Engineering
2120 Electrical & Computer Engineering Building, MC-70
306 N. Wright St
Urbana, IL 61801-299

March 10, 2022

Paul Kenis
Elio E. Tarika Chair and Dept Head
Chemical and Biomolecular Engineering

Dear Paul,

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of technical elective courses in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Electrical and Computer Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,

Bruce Hajek
Head, Department of Electrical and Computer Engineering
Center for Advanced Study Professor of Electrical and Computer Engineering
Hoeft Endowed Chair in Engineering
Professor, Coordinated Science Laboratory

Cc: M. Oelze
C. Bowser



THE GRAINGER COLLEGE OF ENGINEERING

Department of Industrial & Enterprise Systems Engineering
117 Transportation Building, MC-238
104 S. Mathews Ave.
Urbana, IL 61801-2925

TO: Paul Kenis, Department Head
Chemical and Biomolecular Engineering

FROM: Jeff Shamma, Department Head 
Industrial and Enterprise Systems Engineering

DATE: April 1, 2022

SUBJECT: Chemical Engineering Leadership concentration

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Industrial and Enterprise Systems Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

June 22, 2022

To Whom it May Concern:

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Materials Science and Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,



Nancy R. Sottos
Department Head & Swanlund Chair



The Grainger College of Engineering

Department of Mechanical Science & Engineering
Office of the Department Head
1044 Sidney Lu Mechanical Engineering Building, MC-244
1206 W. Green St.
Urbana, IL 61801

February 4, 2022

To Whom It May Concern:

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than ChBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-ChBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by MechSE. Thus, the impact of the ChE MEng concentration on our courses will be minimal.

The Department of Mechanical Science and Engineering (MechSE) is in support of establishing this Chemical Engineering concentration under the GCOE MEng umbrella.

Anthony M. Jacobi

A handwritten signature in black ink, appearing to read 'Anthony M. Jacobi', written over a horizontal line.

Kritzer Distinguished Professor and Head

April 26, 2022

Paul Kenis, Elio E Tarika Chair and Department Head
Department of Chemical and Biomolecular Engineering

Dear Professor Kenis,

The School of Molecular and Cellular Biology (SMCB) is supportive of your proposal to establish the Chemical Engineering Leadership concentration under the GCOE MEng umbrella. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE, and we understand that some small number of these students may wish to enroll in SMCB courses at the 400- and 500-level.

We are happy to allow students in this concentration to enroll in SMCB courses (including MCB, BIOC, and BIOP subjects) **when seats are available**. We continue to refine our seat management strategy in order to be sure that we can accommodate students in an array of SMCB majors, and this process may ultimately make our some of our courses less regularly available to those outside of SMCB.

Because it remains a goal of ours to serve students from majors outside of SMCB when we can, we hope to retain our long-standing posture where we manage enrollment through the official enrollment period, and once all of our students have had an opportunity to enroll, we remove some restrictions so that empty seats can be filled by others. If your students are able to take advantage of those available seats, we are pleased to have them.

We wish you luck with your proposal, and we thank you for your patience in getting this letter to you.

Sincerely,

Melissa Michael
Associate Director for Curriculum & Instruction
mmichae@illinois.edu

cc: Milan Bagchi, Director
School of Molecular and Cellular Biology



THE GRAINGER COLLEGE OF ENGINEERING

Department of Nuclear, Plasma, & Radiological Engineering
216 Talbot Laboratory, MC-234
104 S. Wright St.
Urbana, IL 61801

March 9, 2022

Paul Kenis
Elio E. Tarika Chair and Dept Head
Chemical and Biomolecular Engineering
114 Rogers Adams Laboratory
600 S. Mathews Avenue
Urbana, IL 61801

Dear Paul:

We understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE. We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Nuclear, Plasma, and Radiological Engineering supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,

A handwritten signature in blue ink that reads 'R. J. Williams' with a horizontal line extending to the right.

Professor and Department Head

To Whom it may concern,

The Department of Physics understand that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program in GCOE.

We are aware that the students in this professional master's program can take up to 4 credits of *technical elective courses* in units other than CHBE. Given the projected enrollment of this program, it is expected that no more than 15 students will take a non-CHBE course across all science and engineering programs at UIUC. It is expected that each year no more than 6 students from this CHE MEng concentration will enroll in a 400 or 500-level course in programs administered by our department. Thus, the impact of the CHE MEng concentration on our courses will be minimal.

The Department of Physics supports the establishment of this Chemical Engineering Leadership concentration under the GCOE MEng umbrella.

Sincerely,



Matthias Grosse Perdekamp
Head and Professor.



UNIVERSITY OF
ILLINOIS
URBANA-CHAMPAIGN

The Grainger College of Engineering

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

October 5, 2022

RE: Master of Engineering in Engineering, with a Concentration in Chemical and Biomolecular Engineering

To Whom It May Concern:

The Grainger College of Engineering supports the development of a concentration in Chemical and Biomolecular Engineering within the Master of Engineering framework. The ChBE MEng proposal has been developed with our support and in collaboration with our Graduate, Professional and Online Programs Office, led by Associate Dean Daniel Bodony. If approved, the ChBE MEng will strengthen the GCOE graduate program portfolio, provide ChBE with a new graduate program that has been developed with their alumni and industry connections and maintaining ChBE's renowned excellence, and continue to keep the University of Illinois at the forefront of professional masters education. By GCOE bylaws, ChBE is an equal GCOE unit and the College fully supports the ChBE MEng.

In the future, should ChBE seek to convert their concentration into a major and offer the "Master of Engineering in Chemical and Biomolecular Engineering" MEng degree through the College of Liberal Arts of Science, the College would support this as a natural transition and complement their existing degrees.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rashid Bashir', written over a horizontal line.

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

Cc: Daniel Bodony

Appendix F: Market Research & Financial Resources

1. Market Demand
2. Financial Resources (Table 1)
3. Revenue & Expenses (Table 2)
4. Program Designation Form
5. MOU with Gies College of Business

Master of Engineering in Engineering with a concentration in Chemical Engineering Leadership

MARKET DEMAND

1) What market indicators are driving this proposal? If similar programs exist in the state, describe how this program offers a unique opportunity for students.

The technical challenges of today are more complex, dynamic, and multi-discipline in nature than ever before, and this trend is accelerating. Meeting these challenges requires the integration of engineering, business management, and leadership skills. Professional engineering programs are growing in popularity both in the Grainger College of Engineering and other peer universities. As discussed in a previous section, the interviews conducted with alumni and executives of several companies to identify the key skills to be incorporated into the curriculum also verified the market demand for this type of program (see Appendix A). Across multiple industries, the individuals interviewed stressed the need for strong leadership and business management skills to supplement sound technical skills. They voiced their support for this program and felt that it addressed a need for both their companies and the industries.

Two key aspects will differentiate the ChBE program from other programs. First, it will be accessible on-line to accommodate the needs and schedules of engineers that are currently employed and desire to take the program on a part-time basis. Most other programs are full-time, resident programs that are difficult for both employers and employees to accommodate into their schedules. Second, a unique feature of the ChBE program will be a series of in-person workshops and lectures where participants will assemble for two-day sessions and will meet with experienced industry leaders and senior executives from world-class companies and organizations.

Leadership, business management, and engineering skills only contribute to value when they are applied to real-world challenges and opportunities. Through the workshops and lectures, program participants will learn how the skills, processes, and practices presented in the course material have been successfully applied in a wide variety of roles and situations. In addition, participants will share their personal experiences in smaller break-out sessions, and how the skills that they have learned can be applied to their current work or study opportunities.

Each workshop participant will be expected to develop a personal leadership and development action plan to apply their learnings to their own career objectives. This plan will include immediate actions (what can I apply tomorrow), near-term and long-term actions. Unless skills are exercised and applied to personal situations in an ongoing manner, they will be lost, or their value will be significantly diminished.

2) What type of employment outlook should these graduates expect? Explain how the program will meet the needs of regional and state employers, including any state agencies, industries, research centers, or other educational institutions that expressly encourage the program's development.

Students that seek employment after completing this program on a full-time basis will have a broader set of skills than other BS and MS candidates, and therefore, they will be more attractive to potential employers. They also will have practical experience through the capstone part of the program. In a

competitive market, broader skill sets and prior experience are often the edge that employers are seeking.

For students that are employed by companies and taking the program on a part time basis, they will have the opportunity to apply skills that are learned during the program on a real time basis to the projects they are working for their employers. This application of skills will result in both better solutions for the company and advancement to more complex, higher value opportunities for the student. Broader sets of skills often result in bigger opportunities and career advancement for the employee.

3) What resources will be provided to assist students with job placement?

The current job placement resources in the School of Chemical Sciences Academic Advising and Career Services office will be utilized for students graduating from this program. In addition, students in this program will have access to GCOE career services. Both offices utilize the same shared database on job opportunities.

Master of Engineering in Engineering with a concentration in Chemical Engineering Leadership

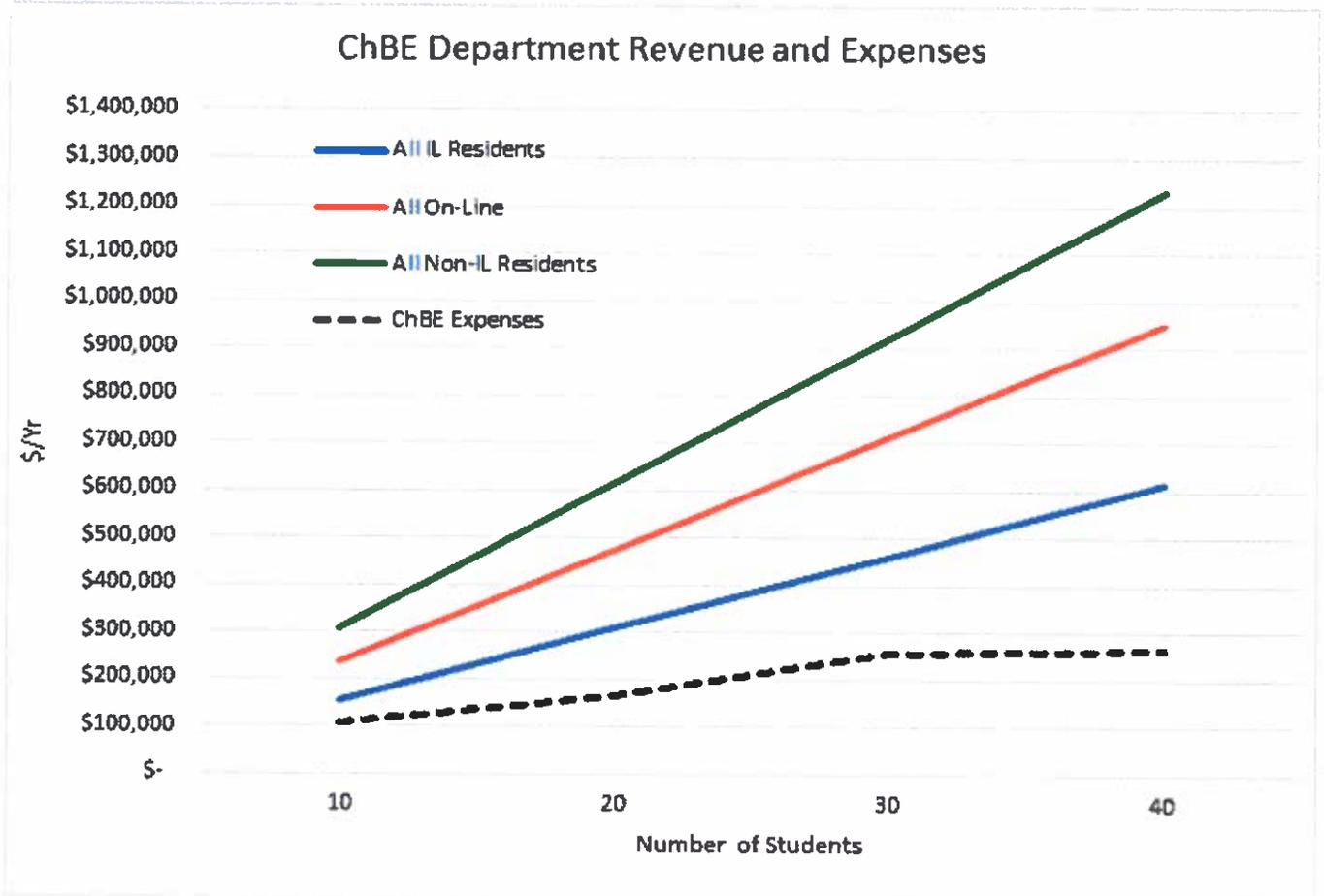
Table 1 Financial Resources

Annual ChBE Revenue, Expenses, and Net Revenue (Proposed MEng ChE Tuition Distribution)					
		Number of FTE students			
		10	20	30	40
Gross Tuition Revenue	\$/Student				
All IL, Full-Time	\$ 25,331	\$ 265,976	\$ 531,951	\$ 797,927	\$ 1,063,902
All On-Line	\$ 37,740	\$ 396,270	\$ 792,540	\$ 1,188,810	\$ 1,585,080
All Non-IL or Intl	\$ 48,200	\$ 506,100	\$ 1,012,200	\$ 1,518,300	\$ 2,024,400
Tuition Distribution (Based on All On-Line)					
Gross Tuition Revenue		\$ 396,270	\$ 792,540	\$ 1,188,810	\$ 1,585,080
GCOE 5% Cost Recovery	5%	\$ 19,814	\$ 39,627	\$ 59,441	\$ 79,254
Gies COB Invoice (8 hrs/student @\$307/hr)		\$ 24,560	\$ 49,120	\$ 73,680	\$ 98,240
Net Revenue to LAS		\$ 351,897	\$ 703,793	\$ 1,055,690	\$ 1,407,586
IVCB expenditure tax	25%	\$ 87,974	\$ 175,948	\$ 263,922	\$ 351,897
LAS portion of revenue	7.6%	\$ 26,744	\$ 53,488	\$ 80,232	\$ 106,977
ChBE Revenue	67.4%	\$ 237,178	\$ 474,356	\$ 711,535	\$ 948,713
ChBE Expenses (w/ 20% cont.)		\$ 110,400	\$ 166,800	\$ 258,000	\$ 264,000
Net ChBE revenue after expenses		\$ 126,778	\$ 307,556	\$ 453,535	\$ 684,713

Master of Engineering in Engineering with a concentration in Chemical Engineering Leadership

Table 2

ChBE Department Revenue and Expenses





GRADUATE COLLEGE

110 Coble Hall, MC-322
801 S. Wright St.
Champaign, IL 61820

PROGRAM TUITION WAIVER POLICY PROPOSAL

Proposals to establish or revise tuition waiver policy for a graduate program will follow a shared governance approval process (Department, School, College, Graduate College).

Definitions of Tuition Waiver Policy Designations:

Traditional Programs. Programs either designated as generating full or base-rate tuition waivers. Base rate waivers waives only the Resident Graduate Base tuition amount. Non-Residents or students in a program with an additional tuition differential will be responsible for the remaining portion of tuition.

Reimbursable Programs. Programs identified as programs that would be reimbursed from an appointing unit outside their academic college.

Cost-recovery and self-supporting programs. Students in approved cost-recovery and self-supporting programs are not eligible to receive tuition and fee waivers except statutory waivers. Students in these programs are not eligible to hold a waiver generating graduate appointment (Assistantship or Fellowship). Full time employees may be admitted to these programs, but their employee waiver is not eligible for use towards a program with this designation.

Additional information related to these tuition waiver designations can be found here:
<http://www.grad.illinois.edu/gradhandbook/2/chapter7/tuition-waivers#otherprovisions>.

PROGRAM INFORMATION

COLLEGE OR SCHOOL: Liberal Arts & Sciences

PROGRAM(s) (Include Program Codes if applicable):
Engineering:Chemical and Biomolecular Engineering, MEng

REQUESTED DESIGNATION (Check box next to desired designation type):

Self-Supporting

Comments:

Investment for Growth program #5883

JUSTIFICATION: On a separate sheet, please address the following.

1. Describe the reasons for this request and explain: (a) the pros and cons of the classification requested, and (b) how the requested classification will benefit and not adversely affect the academic quality of the program.

The professional master' program (MEng) in Chemical Engineering is expected to generate sufficient revenue to be a self-supporting program. This MEng program will attract a combination of full-time students and part-time students who likely will be employed full-time. It is anticipated that many of the part-time students will receive tuition support, either full or partial, from their employers.

2. What type of financial assistance will be offered to students in the program?

This program is expected to generate sufficient funds to support the program director, part-time coordinator, any additional faculty and teaching assistant resources required to deliver a high-quality graduate program. Funds also will provide for part-time assistance from alumni and industry leaders as guest lecturers, project mentors, and workshop facilitators, all of which will be key parts of the program to enhance to overall learning experience for the students.

3. Has this program had past practice of offering graduate assistantships? If so, please describe.

The self-supporting designation is consistent with other MEng programs offered in the Grainger College of Engineering. It is not anticipated that this designation and the exemption from the tuition waiver programs will impact the quality of the program or be a barrier for enrollment for prospective students. Since this is a new program, graduate assistantships have not been offered in the past.

4. What provisions will be made to communicate the new classification to prospective and newly admitted students?

Prospective students applying to the program will be notified via the program website that the MEng in Chemical Engineering is a self-funded program where students are responsible for paying their tuition and fees, and that students in this program are not eligible for Board of Trustee tuition-waiver-generating assistantships at the University of Illinois. Students will be encouraged to visit the Office of Student Financial Aid as well as other external resources for financial support. Links to these resources will be provided on the website. Also, part-time students that are employed will be encouraged to research their company's educational assistance programs.

APPROVALS: (May use Adobe Signature or print and sign the document)

Department Executive Officer Signature and Date: Paul J.A. Kenis Digitally signed by Paul J.A. Kenis
Date: 2022.04.13 15:16:26 -05'00'

Disciplinary College Signature and Date: *Veneta R. Pitton* 4/18/2022

Graduate College Signature and Date: *Alison McKianey* 11/3/22





MEMORANDUM OF AGREEMENT BETWEEN THE
GIES COLLEGE OF BUSINESS
AND
THE COLLEGE OF LIBERAL ARTS AND SCIENCES

Purpose:

This Memorandum of Understanding (MOU), hereafter called the "Memorandum," establishes the relationship between the aforementioned parties with regard to the cross-enrollment of students from Master of Engineering in Engineering (MEng) program with a concentration in Chemical Engineering into Gies College of Business online courses, as described below.

Terms and Responsibilities:

Per the Memorandum, the Gies College of Business shall be responsible for the administration of course enrollment, delivery of specified courses, and the onboarding and support of students.

A representative from the College of Liberal Arts and Sciences or the Master of Engineering in Engineering (MEng) program with a concentration in Chemical Engineering program shall be responsible for providing a list of all students requiring an override and the payment of tuition (per the financial section below) for each seat occupied.

Financial:

The College of Liberal Arts and Sciences agrees to pay tuition to the Gies College of Business as follows. The Gies College of Business will offer business courses as part of the professional development requirements of the Master of Engineering in Engineering (MEng) program with a concentration in Chemical Engineering. These courses will typically include online only sections of: BADM 508, BADM 544, and ACCY 503. In the event that online course section enrollment is constrained by capacity Gies Business and LAS will work together to find agreeable substitutes. Gies will receive \$320 per credit hour (or the current General Management Online Tuition Rate) per student from LAS for each online class for BADM 508, BADM 544, and ACCY 503 in which ChE MEng students enroll. In cases where residential course section enrollment is determined as the agreeable substitute for an online course at capacity, then Gies will receive compensation of \$1,500 (\$750 per credit hour for a 2-credit hour course) for each MEng student enrolled in a residential course section. At the end of the fiscal year, LAS and Gies Business Offices will work together to confirm the number of students and credit hours to be billed and once confirmed, LAS will transfer budget in the agreed upon amount to Gies prior to the close of the fiscal year.



Gies College of Business

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Online Programs
2302 Fox Dr. | Champaign, IL 61820

Duration:

The Memorandum is in effect from July 1, 2022 to June 30, 2023.

Signatures:

By: Nerissa Brown
Associate Dean of Graduate Programs,
Gies College of Business

Date

By: W. Brooke Elliott
Executive Associate Dean of Academic Programs,
Gies College of Business

Date

By: Paul J.A. Kenis
Head, Department of Chemical and Biomolecular Engineering
On behalf of Master of Engineering in Engineering (MEng) program with
a concentration in Chemical and Biomolecular Engineering
College of Liberal Arts and Sciences

Sept 13, 2022
Date

From: [Yang, Hong](#)
To: [McKinney, Allison Ann](#)
Cc: [Carter Pipkins, Kerj](#); [Bodony, Daniel J](#); [Yang, Hong](#)
Subject: RE: CHBE Leadership Concentration Proposal
Date: Wednesday, November 2, 2022 5:47:59 PM

Dear Allison,

At Grainger College of Engineering, a large number of 500- and 400-level courses are offered online each semester. A portion of these online courses, which cover topics ranging from energy, to bioengineering, to sustainability, are suitable as electives for the students in this program. In addition, the prerequisites (if any) for numerous courses of interest to our students, are easily satisfied by students in the program. We will advise students to choose elective offerings in line with their professional goals. The following is a sampling of online courses offered in spring 2023, which meet these criteria and which we would recommend to the students in this program:

- BIOE 574 - Inno/Financial Decision Making, 4 credit hours
- CEE 437 - Water Quality Engineering, 3 credit hours
- MATH 490 XGR - Math of Machine Learning, 3 credit hours
- ME 471 ONL - Finite Element Analysis, 3 credit hours
- NPRE 475 - Wind Power Systems, 4 credit hours
- NPRE 480 ONL - Energy and Security, 3 credit hours
- TAM 445 ONL - Continuum Mechanics, 4 credit hours
- TE 565 - Technol Innovation & Strategy, 4 credit hours
- TE 567 - Venture Funded Startups, 4 credit hours

A number of CHBE elective courses have been taught online in the COVID19 era. We to plan to select some of the existing ChBE elective courses and optimize for future online offerings appropriate for this program in the next few years.

With options for elective offerings discussed above, students in this program are guaranteed sufficient courses each semester to meet the degree requirements.

If you have further questions, feel free to contact me. I hope our program application will receive the final approval by the Executive Committee in time for the review by Education Policy Committee (11/09?) and be included in the agenda for the next Senate meeting (due on 11/14?).

Thanks!

Hong

Hong Yang
Richard C. Alkire Endowed Chair Professor
Department of Chemical and Biomolecular Engineering
University of Illinois at Urbana-Champaign

From: McKinney, Allison Ann <agrindly@illinois.edu>
Sent: Wednesday, November 2, 2022 11:02 AM
To: Yang, Hong <hy66@illinois.edu>
Cc: Carter Pipkins, Keri <kcp@illinois.edu>; Bodony, Daniel J <bodony@illinois.edu>
Subject: CHBE Leadership Concentration Proposal

Dear Professor Yang,

The CHBE Leadership Concentration proposal was reviewed by the Graduate College Executive Committee yesterday and was approved pending the receipt of the following information.

The committee requested clarification regarding the selection of online courses available to fulfill degree requirements.

We have previously received confirmation that the following courses will be offered online by Fall 2023: CHBE 513, CHBE 521, CHBE 516. The required Business courses, BADM 508 and ACCY 503 will be offered online, but which of the technical electives will be available online beside CHBE 516? The committee requested confirmation that at least 2 of the listed technical elective options be available online, to allow for fulfillment of the 8 hours of the technical electives.

Please let me know if you have any questions.

Sincerely,

Allison McKinney
Assistant Dean
Academic Affairs
Graduate College

November 7, 2022

To whom it may concern,

The Technology Entrepreneur Center (TEC) understands that the department of Chemical and Biomolecular Engineering (CHBE) is creating a Chemical Engineering Leadership Concentration under the umbrella of the existing MEng degree program (CHE MEng) in GCOE.

We are aware that the students in this professional master's program are required to take four (4) credits of professional electives. Given the projected steady-state enrollment of 30 students, the impact of the CHE MEng concentration on our courses will be minimal. It is expected that no more than 15 students from the CHE MEng concentration will enroll in 400- or 500-level TE courses annually, including, but not limited to the courses listed below.

- TE 450 Startups: Incorporation, Funding, Contracts, & Intellectual Property (3 credits)
- TE 460 Lectures in Engineering Entrepreneurship (1 credit)
- TE 461 Technology Entrepreneurship (3 credits)
- TE 466 High-Tech Venture Marketing (2 credits)
- TE 565 Technol Innovation & Strategy (2 credits)

TEC supports the establishment of this Chemical Engineering Leadership Concentration under the GCOE MEng umbrella.

Sincerely,



JED L TAYLOR

*Assistant Dean, Innovation and Entrepreneurship
Executive Director*

The Grainger College of Engineering | [Technology Entrepreneur Center](#)
352 Coordinated Science Lab | 1308 W. Main St. | MC 228
Urbana, IL 61801 | 217.244.4035 | jedt@illinois.edu