University of New Mexico

Department of Chemical and Biological Engineering

Graduate Student Handbook

2021-2022

Information provided in this document can change without notice. Refer to the online version for the most up-to-date information at https://cbe.unm.edu/students/graduate/graduate-student-handbook.html

Last Update: August 23, 2021

Contents

Introduction

Welcome to the Department of Chemical and Biological Engineering (CBE) at the University of New Mexico. This handbook contains essential information for all graduate students in the Department of Chemical and Biological Engineering. All students are responsible for understanding and following the information and policies contained in this document.

About CBE

The Department has a variety of established research programs in chemical, biological and materials engineering. These include nano- and biomaterials synthesis, ceramics, bioanalytical micro- and nanosystems, tissue engineering, catalysis, fuel cells, optoelectronic materials, and interfacial and transport phenomena. In many cases, research is done in conjunction with industry and national laboratories. Research is being conducted in a variety of areas, including etching and thin films deposition for microelectronics, fuel cell technology, sol-gel synthesis, CVD thin films, ceramic composites, surface science, catalysis, coal utilization, solar energy, radioactive waste management, ceramics, inorganic membranes, advanced thermal insulation, separation processes and biomedical research.

The principal characterization facilities in the chemical engineering research laboratories provide equipment for: particle size analysis based on sedimentation as well as light scattering, surface area and density measurement of powders, surface analysis via x-ray photoelectron spectroscopy, scanning and transmission electron microscopy, confocal microscopy with hyperspectral imaging, fluorescence and UV-Vis spectroscopy, in-situ IR spectroscopy, thermogravimetric analysis and differential thermal analysis with mass spectrometry, fluid rheology and surface tension measurements and a small angle x-ray scattering facility based on a rotating anode generator and pinhole and Bonse-Hart optics. Additional facilities are available in the Center for Biomedical Engineering (CBME), Center for Emerging Energy Technologies (CEET), Center for Microengineered Materials (CMEM) and the Center for High Technology Materials (CHTM). These include aerosol and catalytic reactors, fuel cell test stations, tissue culture and microbiology laboratories, MOCVD and MBE crystal growth facilities, sol-gel synthesis and optoelectronic materials fabrication and testing.

CBE People, Services, Resources

Name, Title, Contact Info, Location	Role/Services Provided
Dr. Abhaya Datye Distinguished Regents' Professor & Dept Chair datye@unm.edu 505-277-0477 Farris Engineering Center, Rm 1330	Head of CBE Dept: Faculty, Staff, Students Faculty Advisement Feel free to reach out to Dr. Datye with any question, concerns, or ideas.
Dr. Steven Graves Professor, Director of CBE Grad Programs graves@unm.edu 505-277-2043 Centennial Engineering Center, Rm 2045	Faculty Advisor for MS-Plan III students Help with elective selection Guidance for faculty, staff, students for grad program Advisor for PhD until research advisor established Final call on CBE policy/procedure for grad program
Annette Torres Department Administrator II anntorr@unm.edu 505-277-7959 Farris Engineering Center, Rm 1370	Course Scheduling Website Updates Building/Lab Access (Proxy Card)
Vacant Senior Academic Advisor 505-277-5606 Farris Engineering Center, Rm 1380	Minimal advisement on courses Manages CBE funded RA contracts Guidance on Grad Studies Forms, Policy, Procedure Track students from admission to graduation Liaison between students and Grad Studies
Krista Navarrette Senior Academic Advisor krisnava@unm.edu 505-277-1004 Farris Engineering Center, Rm 1220	NE Undergraduate & Graduate Advisement CBE Pre-Major Advisement ***NOTE: Krista will fill in with CBE Graduate Advisement until a new Senior Academic Advisor for CBE is hired.***
Cheryl Brozena Graphic Designer cbrozena@unm.edu 505-277-2225 Farris Engineering Center, Rm 1210	Large Print Jobs Color Printing Binding Website Updates
Mary Rhodes Accountant II mrhodes@unm.edu 505-277-2849 Farris Engineering Center, Rm 1390	Travel: conference fees, hotel, flights, etc. Reimbursements Major equipment purchases that require P.O.

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Geoff Courtin Research Engineer II gcourtin@unm.edu 505-277-1335 CBE Undergraduate Lab, Centennial Engineering Center	Lab Coordinator Lab Safety Coordinator Building/Lab Access (Proxy Card)

Vacant Administrative Assistant II 505-277-5431 Farris Engineering Center, Rm 1300	Equipment Checkout: laptop, projector, etc. Front Desk Support Order supplies for lab Reserve presentation or group study space in FEC

Farris Engineering Center: Building Resources

Building Access (Proxy Card) gives you access to:

1. Farris Engineering Center Entrance after hours (building is typically only open M-F, 8-5)
2. CBE & NE Student Lounge - Access given to CBE & NE Students ONLY
3. CBE & NE Computer Lab - Access given to CBE & NE Students ONLY

FARRIS ENGINEERING CENTER RESOURCES FOR CBE/NE STUDENTS ONLY				
TYPE	**ROOM #**	**AVAILABILITY**	**PRESENTATION DISPLAY**	**OTHER**
STUDY ROOM	1500B	24/7 with proxy access	YES	Reserve online*
STUDY ROOM	1107	24/7 with proxy access	NO	Reserve online*
STUDY ROOM	1025	Monday - Friday, 8AM - 5PM	YES	Reserve online*, Must have a CBE/NE staff member unlock
COMPUTER LAB	2500	24/7 with proxy access	YES	Free printing, Computers have specific programs installed for what you'll need in your CBE courses

* To Reserve, go to: https://goo.gl/P4J7sH (Calendar Key = ksx8wnjf9ia4bz835r)

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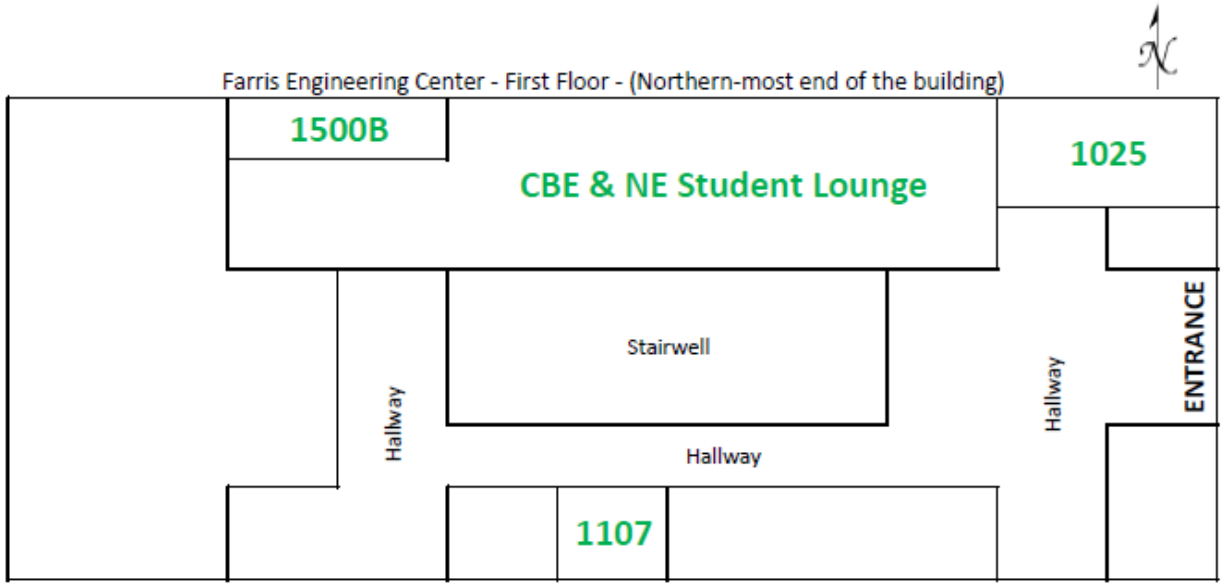

Advisement

Director of Graduate Studies

- Serves as the faculty advisor for MS Plan III students.
- Helps students choose electives to match career and education goals.
- Guidance for faculty, staff, and students regarding the different components of MS and PhD programs.
- Advisor for PhD students until they have set a research/faculty advisor.
- Final call on CBE policy/procedure clarification.

Faculty/Research Advisor

- It is the student's responsibility to establish a research advisor if they are working on the PhD or MS-Plan I or II graduate programs.
- A student's research advisor can be a UNM faculty member from within or outside of CBE. Once a research advisor is established, the student should notify the CBE Senior Academic Advisor. All thesis and dissertation hours should be taken under CBE regardless of the faculty member's home department.
- It is possible for a student to have a research advisor outside of UNM (Sandia National Laboratories, Los Alamos National Laboratories, etc.) so long as a UNM faculty member is willing to serve as a co-research advisor. In this case, the student should sign up for thesis and dissertation hours under a UNM faculty member's name - either the CBE Director of Graduate Programs or a faculty member who is closest to the area of research.
- A student's research advisor will advise the students on which courses are appropriate to take each semester; will mentor them throughout their research; and will advise them on when/how to prepare for the qualifying exam, comprehensive exam, and thesis/dissertation defense.
- They will be the student's guide throughout the whole MS and PhD process from beginning to end.

CBE Senior Academic Advisor

- Minimal advisement on courses.
- Manages RA contracts funded through CBE.
- Answers logistical/administrative questions such as: How/when do I fill out this form? When do I take my Qual Exam? What combination of faculty should I have on my committee?
- Track students from admission to graduation
- Liaison to Graduate Studies for forms and other policy/procedure clarification
- If you need anything at all and are not sure whom to contact, start with the CBE Academic Advisor. If they cannot answer your question directly, they will be able to refer you to the appropriate person/department.

Choosing a Degree Program

MS Plan I (Thesis): This degree is designed for students who want to pursue their career in research. This plan often leads to a PhD program for a more advanced study or a job in a research institute or national laboratories. Students in this plan are trained in both coursework and research to develop an ability to perform research with original thinking. Students consult a faculty research advisor to define a scope of a research problem that can be addressed within approximately two years. At the end of the program, students write an MS thesis and present their research work in a thesis defense. MS thesis is published as an original research document, which can serve both as a report of scholarly research results and as a demonstration of the author's research capability and written communication for future employment. Parts of an MS thesis can be published as a research article in a scientific journal.

MS Plan II (Non-Thesis): This degree is similar to Plan I but MS thesis is exempted. Students who want to perform professional research without writing an MS thesis choose this plan. Research results can be published as a research article in a scientific journal. Students perform a research project with a guidance from a faculty member and give an oral presentation on the research results in an exam at the end of the degree.

MS Plan III (Coursework Only): This degree has emphasis on advanced coursework and does not involve research. Students who seek positions that do not involve research but require advanced knowledge in CBE choose this plan.

PhD in Engineering with a concentration in Chemical Engineering: Students who want to become a professional who can design and perform independent research at a high level choose this degree. An MS degree is not a requirement to pursue this degree. Completion of the degree typically takes 4 – 6 years in engineering disciplines.

CBE Core Courses

All MS and PhD students are required to complete the following 15 hrs of CBE Core Courses. PhD students are required complete the CBE Core Courses in the first year of the program. MS students are encouraged to complete the CBE Core Courses in the first year. Equivalent courses taken at another institution may be used to satisfy these requirements, but they must be approved by the student's research advisor or the CBE Director of Graduate programs.

Semester Offered	Course & Number	Title	Credit Hours

Fall	CBE 521	Advanced Transport Phenomena	3
Fall	CBE 525	Methods of Analysis in Nuclear, Chemical and Biological Engineering	3
Spring	CBE 502	Chemical & Biological Engineering Research Practices	3
Spring	CBE 542	Advanced Chemical Engineering Thermodynamics	3
Spring	CBE 561	Kinetics of Chemical Processes	3

Technical Electives

Technical Electives for MS Plan I, II, and III and PhD should be chosen in consultation with the CBE Director of Graduate Programs or the student's research advisor. They may include the following:

- Any graduate level course taught by the School of Engineering (BME, CBE, CE, CS, ECE, ME, NE, ENG, NSME)
- Any graduate level course taught by the departments of Chemistry & Chemical Biology (CHEM), Mathematics & Statistics (MATH, STAT), or Physics & Astronomy (PHYS, ASTR)
- Students interested in business management may also choose from: MGMT 501, 502, 504, 508, 511, 520, 526, 560, 564, 598, or 600.
- Problems/Independent Study/Research Courses may be taken and applied toward technical electives with permission of the CBE Director of Graduate Programs. A petition outlining the work completed, the number of credit hours earned, and the number of hours committed per week toward the course along with signatures from both the student and the instructor should be submitted to the CBE Director of Graduate Programs (with cc to CBE Senior Academic Advisor) for consideration for use toward technical electives prior to taking the course. Please note the following limits toward the overall number of Problems/Independent Study/Research Courses that can be applied toward the degree:
    - MS Plan I: 3 hrs
    - MS Plan II & III: 6 hrs
    - PhD: 6 hrs beyond the MS degree
- Students may not apply seminar or lab group meeting credit toward technical electives.

NOTE: Graduate level course is defined as any 500-level course or higher OR any 300- or 400-level course that has a "*" or any 300- or 400-level, non-CBE course with a "**" in the UNM Catalog course descriptions.

Electives

The only degree program that requires electives is the PhD program. They may include the following:

- Any graduate level course taught by the School of Engineering (BME, CBE, CE, CS, ECE, ME, NE, ENG, NSME)
- Any graduate level course taught by the departments of Chemistry & Chemical Biology (CHEM), Mathematics & Statistics (MATH, STAT), or Physics & Astronomy (PHYS, ASTR)
- Students interested in business management may also choose from: MGMT 501, 502, 504, 508, 511, 520, 526, 560, 564, 598, or 600.
- No more than 6 hrs beyond the MS degree of Problems/Independent Study/Research Courses may be applied toward the PhD. No petition is required to use this type of course as an elective.

- Students may apply seminar or lab group meeting credit toward electives. This can include extra CBE 501 credit.
- NOTE: Graduate level course is defined as any 500-level course or higher OR any 300- or 400-level course that has a "*" or any 300- or 400-level, non-CBE course with a "**" in the UNM Catalog course descriptions.

CBE 501: Chemical & Biological Engineering Seminar

All CBE Graduate students are required to register for CBE 501: Chemical & Biological Engineering Seminar each semester unless otherwise approved by the CBE Director of Graduate Programs. Up to 3 hrs may be applied toward the coursework requirement of the MS degree and up to 18 hrs total for the PhD degree. If student completes the MS degree in less than three fall/spring semesters, technical electives may be taken to make up the CBE Seminar credit hours.

MS Degree Requirements

The Master of Science (M.S.) in Chemical Engineering degree is offered under **Plan I: Thesis**, **Plan II: Project**, and **Plan III: Coursework Only**. All students are initially admitted to Plan III. It is only with support from a faculty member that a student may move to Plan I or Plan II.

To meet general requirements for a master's degree a student must:

1. Complete the coursework requirements of a Plan I, II, or III
2. Maintain a cumulative grade point average of 3.0 or higher
3. Complete a Program of Studies approved by the Dean of Graduate Studies
4. Complete at least 50% of required coursework after admission to the graduate program
5. Complete no more than 6 credit hours of coursework in which a grade of "C" (2.0), "C+" (2.33) or "CR" (grading option selected by student). Courses offered only on a CR/NC basis and required by the graduate program are excluded from this limitation.
6. Pass the Master's Examination and/or Final Examination for Thesis except for the Plan III program, which is coursework only
7. Meet the 7-year time limit for completion of degree requirements.

PLAN	CBE CORE Courses (hrs)	CBE 501: Seminar – (hrs)	CBE 599: Thesis Hours (hrs)	Electives (hrs)	TOTAL Required Credit Hours (hrs)
I: Thesis	15	3	6	6	30
II: Project	15	3	0	12	30
III: Coursework Only	15	3	0	12	30

Program of Studies Form

The Program of Studies (POS) form must be submitted by all MS students as a step toward graduation. It is an electronic form that you complete through https://gradforms.unm.edu/. On this form you will indicate each of the courses that apply toward your MS degree. It is reviewed by the CBE Senior Academic Advisor, then by the CBE Director of Graduate Programs, and then by the Dean of Graduate Studies. If approved by all three, you are then eligible to be added to a pending graduation list. Without

approval of this form, you cannot graduate. Shared Credit Students must indicate which courses they took while in their undergraduate program under the Shared Credit Program in the "Multiple Credential" column on the POS form.

DEADLINES: You are eligible to submit the form only after you have completed a minimum of 12 hours of graduate coursework. It must be completed no later than the semester prior to your anticipated graduation following these specific deadlines: March 1 for Summer graduation, July 1 for Fall graduation, and October 1 for Spring graduation. Since there are three separate reviews that must happen after you submit your POS, we recommend you submit your POS at least two weeks prior to the deadline dates to give enough time for the review process on the CBE department level so that your POS does reach Graduate Studies by their deadline dates (March 1, July 1, or Oct 1).

REVISIONS: If you need to make a change to your POS after it has been approved, please notify the CBE Senior Academic Advisor. The CBE Senior Academic Advisor will need to send a memo to Graduate Studies to notify them that we approve of the change in your plan of studies.

Plan I: Thesis

Students who wish to complete Plan I: Thesis must first find a faculty member to agree to serve as their research advisor. Once this has been established students may then move to Plan I from Plan III with permission of the CBE Director of Graduate Studies.

Coursework Requirements:

1) CBE Core Courses – 15 hrs
2) CBE 501: Seminar – 3 hrs
3) CBE 599: Thesis – 6 hrs
   a) May be taken 1-6 hrs at a time
   b) No limit on how many times it can be taken
   c) Must be taken under CBE even if a student's research advisor's home department is outside of CBE.
4) Technical Electives – 6 hrs

Example Schedule:

1st Semester (FALL)	2nd Semester (SPRING)	3rd Semester (FALL)
CBE 501 (1)	CBE 501 (1)	CBE 501(1)
CBE 521 (3)	CBE 502 (3)	Technical Elective (3)
CBE 525 (3)	CBE 542 (3)	Technical Elective (3)
Technical Elective (3)	CBE 561 (3)	Technical Elective (3)
	Submit POS – Due: March 1st	

Forming a Committee

The role of the examination committee is to approve the exam questions, conduct the exam/defense, evaluate the student response, and report the results. Each committee must consist of a minimum of three members approved by Graduate Studies. The examination committee must follow the following criteria, as appropriate. Category levels for faculty are given in Appendix.

1. *Two* members must be Category 1 OR *one* member can be Category 1 and *one* member may be Category 3 if his/her appointment is within the student's major.
2. The chair of the exam committee must be Category 1, 5 or 3, if his/her appointment is within the student's major.
3. The third member can be any Category (1-6).
4. A co-chair can be from any Category (1-6) as long as the other co-chair is a Category 1 or 3 if his/her appointment is within the student's major.

NOTE: No more than one voting member can be in Category 4.

Announcement of Exam

The student must notify Graduate Studies of the scheduled master's examination date by electronically submitting the appropriate announcement form. This form can be completed through https://gradforms.unm.edu/. The announcement form must be filed at least two weeks before the master's examination, and no later than the published deadline dates (November 1 for Fall, April 1 for Spring or July 1 for Summer). However, we recommend that you submit this form earlier if you can as your selected committee is reviewed and approved as part of this process. If one of the committee members you have selected has not yet been approved for committee service, they will need to go through the approval process, which can take time. If you need help getting a committee member approved for service, please contact the CBE Senior Academic Advisor.

Thesis Exam

The master's examination (thesis defense) may be taken only after the Program of Studies has received approval by the Graduate Dean and only if the student is in good academic standing. To remain in good academic standing students must maintain a cumulative grade point average of at least 3.0 over all courses taken for graduate credit after admission to a graduate degree program at the University of New Mexico. Thesis should be prepared before the defense date and given to the committee as a written part of the exam. Thesis defense is an oral part of the exam. The student gives a presentation on the research results typically less than an hour and answer questions from the committee on the presentation. Thesis can be improved after the defense exam based on input from the committee. Students are responsible for reminding the committee chair of their thesis defense to complete the CBE Outcomes Assessment Rubric - MS.

Report of Examination

Each committee member with a UNM netID is required to record their decision through the electronic Report of Examination. Committee members without UNM netIDs are informed that they will give their proxy decision through the Chair of the committee who will record their decision. The results of the examination (pass or fail) must be reported to Graduate Studies by November 15 for Fall graduation, April 15 for Spring graduation or July 15 for Summer graduation.

Format and Submit Thesis

https://grad.unm.edu/resources/start-to-finish-unm/masters/format-submit-thesis.html

Students are responsible for preparing theses in proper format (traditional or non-traditional), which is of high quality and free of grammatical and typing errors. Guidelines on thesis format are detailed and should be carefully followed. Students are urged to see **current manuscript guidelines and forms** and **consult manuscript templates**. They should also consider consulting with **Mayra Estrada**, the

Graduate Studies manuscript reviewer in Graduate Studies. A **"Preparing Your Manuscript" tutorial** is available online through Graduate Studies, and **thesis formatting workshops** are also offered each semester.

Plan I master's students must **electronically submit** their theses within ninety (90) days of passing the final examination for the thesis. If theses are not submitted within that time, students must schedule and complete a second final examination for the thesis. In all cases the results of the thesis defense must be submitted to Graduate Studies no later than two weeks after the announced date of the thesis defense.

Plan II: Non-Thesis (Project-Based)

Students who wish to complete Plan II: Non-Thesis (Project-Based) must first find a faculty member to agree to serve as their research advisor. Once this has been established, students may then move to Plan II from Plan III. Then, MS Plan II is considered a terminal or professional degree. This non-thesis option requires completion of a Master's research project under the direction of a faculty member (typically done as part of a Problems course). The research results are then presented in a Master's Examination, consisting of an oral presentation and defense of the student's major project, as well as demonstrating knowledge of broader principles of the discipline.

Coursework Requirements:

1) CBE Core Courses – 15 hrs
2) CBE 501: Seminar – 3 hrs
3) Technical Electives – 12 hrs

Example Schedule:

1st Semester (FALL)	2nd Semester (SPRING)	3rd Semester (FALL)	4th Semester (SPRING)
CBE 501 (1)	CBE 501 (1)	CBE 501 (1)	CBE 501 (1)
CBE 521 (3)	CBE 502 (3)	Technical Elective (3)	Technical Elective (3)
CBE 525 (3)	CBE 542 (3)	Technical Elective (3)	Submit Announcement of Exam – Due: 2 weeks prior to exam
Technical Elective (3)	CBE 561 (3)	Submit POS – Due: Oct. 1st	Master's Exam & Report of Exam – Due: April 15th

Forming a Committee

The role of the examination committee is to approve the exam questions, conduct the exam/defense, evaluate the student response and report the results. Each committee must consist of a minimum of three members approved by Graduate Studies. The examination committee must follow the following criteria, as appropriate. Category levels for faculty are given in Appendix.

1. *Two* members must be Category 1 OR *one* member can be Category 1 and *one* member may be Category 3 if his/her appointment is within the student's major.
2. The chair of the exam committee must be Category 1, 5 or 3, if his/her appointment is within the student's major.
3. The third member can be any Category (1-6).

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4. A co-chair can be from any Category (1-6) as long as the other co-chair is a Category 1 or 3 if his/her appointment is within the student's major.

NOTE: No more than one voting member can be in Category 4.

Announcement of Exam

The student must notify Graduate Studies of the scheduled master's examination date by electronically submitting the appropriate announcement form. This form can be completed through https://gradforms.unm.edu/. The announcement form must be filed at least two weeks before the master's examination, and no later than the published deadline dates (November 1 for Fall, April 1 for Spring or July 1 for Summer). However, we recommend that you submit this form earlier if you can as your selected committee is reviewed and approved as part of this process. If one of the committee members you have selected has not yet been approved for committee service, they will need to go through the approval process, which can take time. If you need help getting a committee member approved for service, please contact the CBE Senior Academic Advisor.

Master's Exam

The student gives a presentation on the research results typically less than an hour and answer questions from the committee on the presentation. Students are responsible for reminding the committee chair of their Master's Exam to complete the CBE Outcomes Assessment Rubric - MS.

Report of Examination

Each committee member with a UNM netID is required to record their decision through the electronic Report of Examination. Committee members without UNM netIDs are informed that they will give their proxy decision through the Chair of the committee who will record their decision. The results of the examination (pass or fail) must be reported to Graduate Studies by November 15 for Fall graduation, April 15 for Spring graduation or July 15 for Summer graduation.

Plan III: Coursework Only

This degree has emphasis on advanced coursework and does not involve research. Students who seek positions that do not involve research but require advanced knowledge in CBE choose this plan.

Coursework Requirements:

1. CBE Core Courses – 15 hrs
2. CBE 501: Seminar – 3 hrs
3. Technical Electives – 12 hrs

Example Schedule:

1st Semester (FALL)	2nd Semester (SPRING)	3rd Semester (FALL)
CBE 501 (1)	CBE 501 (1)	CBE 501 (1)
CBE 521 (3)	CBE 502 (3)	Technical Elective (3)
CBE 525 (3)	CBE 542 (3)	Technical Elective (3)
Technical Elective (3)	CBE 561 (3)	Technical Elective (3)
	Submit POS – Due: March 1st	

PhD Degree Requirements

Students who wish to complete the PhD-Engineering-Chemical Engineering degree are responsible for establishing a faculty member to serve as their research advisor.

To meet the general requirements for a PhD degree, a student must:

1) Complete a minimum of 48 credit hours of graduate credit coursework excluding dissertation hours.
2) Be enrolled in at least one credit hour of graduate credit in the semester in which the doctoral comprehensive examination is taken.
3) Complete at least 24 credit hours of graduate credit coursework at the University of New Mexico.
4) Complete at least 18 credit hours graduate credit coursework at the University of New Mexico after admission to the doctoral program.
5) Earn a minimum of 18 hours of graduate credit coursework in University of New Mexico courses numbered 500 or above.
6) Complete no more than 6 credit hours of coursework in which a grade of "C" (2.0), "C+" (2.33) or "CR" (grading option selected by student) was earned. Courses offered only on a CR/NC basis and required by the graduate program are excluded from this limitation.
7) Complete no more than 50% of the required course credit hours at the University of New Mexico with a single faculty member (coursework that has been completed for the master's degree is included in this limit).
8) Complete Comprehensive Exam by the end of the 5th semester in the PhD program.
9) Complete all degree requirements within five calendar years from the semester in which they pass the Comprehensive Exam.
10) Complete a minimum of 18 credit hours of dissertation credit hours (CBE 699) after successful completion of the Comprehensive Exam. Dissertation hours must be taken under CBE even if the student's research advisor's home department is outside of CBE.
11) Be enrolled in the semester in which they complete degree requirements, including the summer semester.

Coursework Requirements (48 hrs):

- CBE Core Courses – 15 hrs
- CBE 501: Seminar – 6 hrs
- Technical Electives – 15 hrs
- Electives – 12 hrs

Dissertation Hours (18 hrs)

- Students must maintain continuous enrollment, excluding summer semesters, from the first semester of registering in dissertation hours through the semester of graduation.
- Enrollment in CBE 699 should not begin prior to the semester in which the student takes the doctoral comprehensive examination.
- Only those credit hours gained in the semester during which the comprehensive examination is passed and in succeeding semesters can be counted toward the 18 dissertation hours required.

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- A student who fails the comprehensive exam cannot apply any CBE 699 credit hours toward their program of studies until the semester in which the comprehensive examination is retaken and passed.
- May be taken for 3-12 hrs at a time with 9 hrs at the maximum in a summer semester.
- No limit on how many times it may be taken.
- Must be taken under CBE 699 even if the student's research advisor's home department is outside of CBE.

Example Schedule:

1st Year		**2nd Year**	
1st Semester (FALL)	**2nd Semester (SPRING)**	**3rd Semester (FALL)**	**4th Semester (SPRING)**
CBE 501 (1)	CBE 501 (1)	CBE 501 (1)	CBE 501 (1)
CBE 521 (3)	CBE 502 (3)	Technical Elective (3)	Technical Elective (3)
CBE 525 (3)	CBE 542 (3)	Technical Elective (3)	Elective (3)
Technical Elective (3)	CBE 561 (3)	Technical Elective (3)	Elective (3)
	Qualifying Exam taken in Summer – 2 weeks prior to Fall semester		

3rd Year		**4th Year**	
5th Semester (FALL)	**6th Semester (SPRING)**	**7th Semester (FALL)**	**8th Semester (SPRING)**
CBE 501 (1)	CBE 501 (1)	CBE 501 (1)	CBE 501 (1)
Elective (3)	CBE 699 (6)	CBE 699 (6)	CBE 699 (6)
Elective (3)			Submit Announcement of Exam – Due: 2 weeks prior to exam
Submit Announcement of Exam – Due: 2 weeks prior to exam			Dissertation Defense, Report of Exam, Format & Submit Dissertation – Due: April 15th
Comprehensive Exam taken no later than 5th semester			

Qualifying Exam

Students should take a qualifying exam after the first year. To take the exam, they should have finished CBE core courses. Before the exam, students are given three research articles and select one of them based on their interest. Each student reviews the article and related references. Based on the article, the student proposes a research project that could take 3 – 4 years. The proposed work is not a project that the student will actually perform. Rather, the purpose of the proposal is to demonstrate the student's ability to define scientific problems and to solve them creatively. The student is given two weeks to study the article and plan the project. In the exam, the student gives two separate

presentations, each taking ~10 and 30 minutes, respectively. In the first presentation, the student gives a critique of the journal article. The committee evaluates scientific understanding of the student by listening to the presentation and asking related questions. In the second part, the student gives a presentation on the research proposal. Based on the proposal, the committee evaluates the student's originality, creativity, and ability to define and formulate scientific problems. In both presentations, the student's ability to communicate his/her ideas and knowledge professionally is also assessed. The exam is open to general questions on CBE so that the student should be able to demonstrate mastery of the CBE core courses and general understanding of basic science.

The committee wants each student to pass the exam and will try to help him/her through the exam. Nevertheless, the student needs to demonstrate a sound scientific understanding and an ability to communicate ideas to pass the exam. Some suggestions to succeed in the exam are the following: (1) study the journal article carefully including important references. (2) Avoid rash critique of the article. A research article is typically a product of long-time research and thinking by multiple professionals and is examined by specialists of the field to be allowed for publication. In the article, identify unsolved problems that, when solved, would elucidate scientific understanding of the subject. (3) Do not plan technology development that technicians can do. You want to demonstrate your original thinking and ability to advance knowledge by a careful plan, which is expected not for a technician but for a PhD. (4) Do not talk about something that you do not understand clearly. The committee can ask questions based on what you talk. (5) Listen carefully to the questions and do not answer them before understanding them. If the questions are not clear to you, ask for clarification. (6) Answer only to the questions. If you talk about something else, the committee can pick it up and ask more probing questions on it. Do not call for additional questions. (7) Practice your presentation multiple times by voicing it, so that you avoid panic during the exam by getting use to the presentation.

Forming a Committee

The role of the examination committee is to approve the exam questions, conduct the exam, evaluate the student response and report the results. Each committee must consist of a minimum of three members approved by Graduate Studies. The examination committee must follow the following criteria, as appropriate. Category levels for faculty are given in Appendix.

1. *Two* members must be Category 1 OR *one* member can be Category 1 and *one* member may be Category 3 if his/her appointment is within the student's major.
2. The chair of the exam committee must be Category 1, 5 or 3, if his/her appointment is within the student's major.
3. The third member can be any Category (1-6).
4. A co-chair can be from any Category (1-6) as long as the other co-chair is a Category 1 or 3 if his/her appointment is within the student's major.

NOTE: No more than one voting member can be in Category 4.

Comprehensive Exam

Comprehensive exam should be taken before the end of the 5th semester in the PhD program. It consists of a written and an oral part. For the written exam, the student writes a research proposal that should not exceed 15 pages. This page limit applies to the main text excluding references and there is no page limit on references. Example research proposals can be accessed by clicking on the following links: National Science Foundation (NSF), National Institutes of Health (NIH), and Army Research Office

(ARO). The proposal, which is based on the current project, should be submitted to the exam committee at least a few days before the oral exam. In the oral exam, the student gives presentations on preliminary results and a research plan toward the PhD defense. The student should demonstrate an ability to perform independent research based on original thinking. The exam is not a place to test originality of the ideas of the student's advisor.

General Requirements

1) Students must have a cumulative GPA of at 3.0 at the time of their examination.
2) Students must be enrolled in a minimum of 1 hr of graduate coursework in the semester the exam is taken. Students may enroll in CBE 699: Dissertation hours to prepare for the exam, however, those credits will only count toward the overall 18 hrs of required dissertations hours if taken within the same semester as the passed exam.
3) If exam is taken outside spring or fall semester, the student must be registered for the following semester.

MS en Route

PhD students who do not already have an MS in Chemical Engineering may earn one en route to PhD. The student must follow the MS degree requirements as outlined in this handbook. There are two options:

1) **MS-Plan III (Coursework Only):** A student should submit the POS for the MS Plan III en route degree during their second semester, as they are finishing the CBE core courses with the anticipation that they will complete the 30 hrs of coursework in the third semester of the program, the semester following the Qual Exam.
2) **MS-Plan I (Thesis):** The PhD Comprehensive Exam may also serve as the MS exam for those students pursuing the MS Plan I (Thesis) degree. In this case, the student would submit the POS for the MS Plan I en route degree in their fourth semester with the anticipation they would be completing the Comprehensive Exam in their fifth semester. Students wishing to pursue this degree would also need to be sure that they had registered for CBE 599: Thesis in the fourth and fifth semester (3 hrs each semester).

Forming a Committee

The role of the examination committee is to approve the exam questions, conduct the exam, evaluate the student response and report the results. Each committee must consist of a minimum of three members approved by Graduate Studies. Although this committee generally remains intact as part of your Dissertation Committee, some members may change with permission from your advisor. The examination committee must follow the following criteria, as appropriate. Category levels for faculty are given in Appendix.

1. Two members must be Category 1 OR one member can be Category 1 and one member may be Category 3 if their appointment is within the student's major
2. The chair of the exam committee must be Category 1, 5 or 3, if their appointment is within the student's major
3. The third member can be any Category (1-6)
4. A co-chair can be from any Category (1-6) as long as the other co-chair is a Category 1 or 3 if his/her appointment is within the student's major

5. No more than one voting member can be in Category 4. Departments can impose a more restrictive structure for exam committees.

Announcement of Exam

The student must notify Graduate Studies of the scheduled comprehensive examination date by electronically submitting the appropriate announcement form. This form can be completed through https://gradforms.unm.edu/. The announcement form must be filed at least two weeks before the comprehensive examination. However, we recommend that you submit this form earlier if you can as your selected committee is reviewed and approved as part of this process. If one of the committee members you have selected has not yet been approved for committee service, they will need to go through the approval process, which can take time. If you need help getting a committee member approved for service, please contact the CBE Senior Academic Advisor.

Exam Results

Pass – Student may continue in the program and may begin taking dissertation hours.

Conditional Pass – Having evaluated the materials required for the examination, if the Committee feels that, although the student has demonstrated knowledge and understanding of the field, it is not quite sufficient to justify a grade of "pass," the committee may assign the grade of "Conditional Pass" and require that the student meet additional conditions before a grade of pass will be awarded. The student must meet the conditions noted on the Conditional Pass by the end of the subsequent term. However, students who plan to graduate in a specific term must resolve a Conditional Pass by the posted deadline for submission of examination results. The committee will note the conditions that need to be met by the student on the examination form. Once the committee indicates the student has met the conditional pass criteria, they will submit a memo to Graduate Studies.

Retake – If the committee recommends a retake, it must be completed within one calendar year of the first examination. The comprehensive exam may only be taken twice. A second failure will result in the student's termination from the program.

Fail – Student is no longer able to continue in the PhD program.

Application for Candidacy

The Application for Candidacy (AC) form must be submitted by all PhD students as a step toward graduation. It is an electronic form that you complete through https://gradforms.unm.edu/. On this form you will indicate each of the courses that apply toward your PhD degree. It is reviewed by the CBE Senior Academic Advisor, then by the CBE Director of Graduate Programs, and then by the Dean of Graduate Studies. If approved by all three, you are then eligible to be added to a pending graduation list. Without approval of this form, you cannot graduate.

DEADLINES: You are first eligible to submit the form during the semester in which you pass the Comprehensive Exam. It must be completed no later than the last day of the semester prior to your anticipated graduation. Since there are three separate reviews that must happen after you submit your POS, we recommend you submit your POS at least two weeks prior to the deadline dates to give enough time for the review process on the CBE department level so that your POS does reach Graduate Studies by their deadline dates (March 1, July 1, or Oct 1).

REVISIONS: If you need to make a change to your AC after it has been approved, please notify the CBE Senior Academic Advisor. The CBE Senior Academic Advisor will need to send a memo to Graduate Studies to notify them that we approve of the change in your plan of studies.

Dissertation Exam

In order to be eligible to take the Dissertation Exam, the student must have successfully passed the Comprehensive Exam and have had their Application for Candidacy approved by Graduate Studies.

Final defense consists of two parts. In the first part, the student gives a public seminar which integrates the whole work performed during the PhD course. In the second part, the public leaves the room and the committee examine the thesis and its intellectual merit in more detail. Students are responsible for reminding the committee chair of their dissertation defense to complete the CBE Outcomes Assessment Rubric-PhD.

Forming a Committee

The role of the dissertation committee is to supervise a doctoral candidate's dissertation activity. The Dean of Graduate Studies must approve each member for committee service. The committee must consist of a minimum of four members; 2 of the 4 must have Category 1 approval. Category levels for faculty are given in Appendix.

1. Chair must have approval as a Category 1, 5 or 3 if his/her appointment is within the student's major
2. The second member must have approval as Category 1 or 3 if his/her appointment is within the student's major
3. The third member (external/outside) must have approval as Category 2 if selected from the faculty of an institution other than UNM, or Category 1 if a UNM faculty member outside the student's discipline
4. The fourth member can have approval as Category 1-6
5. Co-Chair (optional) must have approval as a Category 1-6

No more than one voting member may be in Category 4.

Announcement of Exam

The student must notify Graduate Studies of the scheduled dissertation defense date by electronically submitting the appropriate announcement form. This form can be completed through https://gradforms.unm.edu/. The announcement form must be filed at least two weeks before the dissertation defense. However, we recommend that you submit this form earlier if you can as your selected committee is reviewed and approved as part of this process. If one of the committee members you have selected has not yet been approved for committee service, they will need to go through the approval process, which can take time. If you need help getting a committee member approved for service, please contact the CBE Senior Academic Advisor.

Format and Submit Dissertation

https://grad.unm.edu/resources/start-to-finish-unm/phd/format-submit-dissertation.html

The doctoral candidate is responsible for preparing a dissertation in the proper format that is of high quality and free of grammatical and typing errors. **Guidelines on dissertation format** are detailed and should be carefully followed. Students are urged to carefully review **current guidelines** before defending

their dissertations; they may also wish to attend the **Dissertation Formatting Workshop**, offered through Graduate Studies, or consult with **Mayra Estrada**, the Graduate Studies manuscript reviewer.

After passing the dissertation defense, doctoral students must electronically submit their dissertations within ninety (90) days or by the term graduation deadline, whichever comes first. If the manuscript is not submitted within that time, the student must schedule and complete a second final examination for the dissertation. In all cases the results of the dissertation defense must be submitted to Graduate Studies no later than two weeks after the announced date of the dissertation defense.

The University of New Mexico encourages **open access** to all theses and dissertations produced for graduate degrees. Electronic thesis/dissertation (ETD) submissions are uploaded to the **LoboVault repository**, a digital archive, where they are accessible for search and download through web search engines such as Google. The University of New Mexico has implemented an **embargo restriction policy** that enables students, with approval from their advisors and Graduate Studies, to delay public-wide access to their work in **LoboVault**. Before defending your thesis or dissertation, please consult with your committee chair and review the **embargo restriction policy** to determine whether or not you should release your work to open access or petition for an appropriate embargo option.

Please check the **Thesis/Dissertation webpage** or use the links below for more information on thesis/dissertation policies and procedures.

- **Thesis/Dissertation Guidelines**
- **Dissertation Manuscript Formatting Workshop**
- **Manuscript Tutorial**
- **UNM Digital Repository**
- **Manuscript Templates**
- **Open Access**
- **ProQuest-UMI repository**
- **Submitting Your Electronic Thesis or Dissertation**

Funding

Graduate Studies provides an overview of many different types of funding resources for UNM Graduate Students on their Funding website. Below is an overview of some of these as they pertain specifically to CBE and the School of Engineering (SOE).

- **Research Assistantships (RA)** – All applicants to the MS and PhD programs are reviewed for RA potential when their applications to the program are initially reviewed by the CBE Graduate Admission Committee. If there is a faculty member with available funding that is interested in hiring a student as an RA, the funding offer is made at the time the admission offer is made. If you are not offered an RA position at the point of admission, you can reach out to faculty to see if they have available funding and to see if they believe you may be a good fit for their lab. RA contracts will cover health insurance and include a monthly stipend. It may also cover tuition and fees.
- **Scholarships** – SOE offers scholarships for graduate students. The Graduate Student Success Scholarship has a deadline of October 31st and the SOE Scholarships for Graduate Students, which include CBE departmental scholarships, has a deadline of June 1st.
- **David and Jo Whitten Family Endowed Fellowship** – This fellowship is for first year graduate students who have been accepted into the Biomedical Engineering, Chemical & Biological

Engineering, or Nanoscience & Microsystems Engineering programs. Women, minorities, and international students are encouraged to apply. To be considered for the fellowship, students should submit the application for SOE Scholarships for Graduate Students.

- **Employment Opportunities** – CBE hires graduate students as hourly employees to be graders and Peer Learning Facilitators for our undergraduate courses. Students hired for these positions have typically already successfully completed the course during their undergraduate studies.

Resources

UNM Graduate Studies – Graduate Studies has a webpage that includes information on resources for Academic Development, Free Workshops, International Student Support, LoboRespect, Mind, Body, & Wellness, Professional Development, Publishing Tips & Tricks, Student & Campus Organizations, Teacher Developments, and Ethics & Integrity in Research.

UNM Graduate Resource Center - The mission of the Graduate Resource Center (GRC) is to increase graduate student retention, reduce time to degree completion, and foster graduate student learning communities across the University of New Mexico through writing, statistics, and research support facilitated by peer consultations and workshops that help students develop strategies to be effective academics, researchers, and professionals. Join the GRC Listserv HERE to get emails about upcoming events and workshops.

Centennial Science & Engineering Library – Holly Surbaugh (hsurbaugh@unm.edu|505-277-0244|Centennial Library, L164) is the subject librarian for engineering students.

Research Facilities – Please see the CBE website for more information on research facilities that are available to graduate students.

Two others that you have already added to the newer version

Appendix: Category levels for faculty

There are **six categories**, each with a specific set of criteria and role on a committee as follows:

- **Category One:** UNM tenured or tenure-track faculty or UNM-National Laboratory Professors. Role: chair or a member of any master's or doctoral committee in any discipline, regardless of the Faculty member's FTE status.
- **Category Two:** Tenured or tenure-track faculty at other institutions. Role: external member on dissertation committee. CV required.
- **Category Three:** Individuals (not tenured/tenure track) whose primary employer is UNM and who hold the titles of **research** professor, **research** associate professor, **research** assistant professor; **clinician educators** with the rank of professor, associate professor assistant professor or faculty hired onto the flex track or "V" category in the School of Medicine. Role: co-chair or member of master's or dissertation committee; may only chair committees if his/her appointment is within the student's major.
- **Category Four:** Others who are considered experts in the field. Role: voting member of the committee. CV required.
- **Category Five:** Emeriti/Emeritae faculty may continue to chair existing committees for up to one calendar year from the date of their retirement if the graduate unit approves. They may not be appointed chair of any new committees once retired. Role: Chair, co-chair, or voting member of the committee

Last Update: August 23, 2021

- **Category Six:** After the first year of retirement, Emeriti/Emeritae faculty may continue to serve on committees if the graduate unit approves. Role: Co-Chair or voting member of the committee