College of Engineering, Computing and Applied Science

Bioengineering

Departmental Honors in Bioengineering requires the following courses totaling 7 credit hours:

BIOE	4150/6150	Research Principles and Concepts (1)
	4910	Mentored Research in Bioengineering (1-4) for a total of six credit hours over a period of two semesters

The Departmental Honors program in Bioengineering provides exceptional students training and practical experience in the conduct of experimental research under the supervision of a faculty advisor. BIOE 4150 provides academic training in research planning, ethical conduct, professional documentation, and dissemination in both oral and written formats. Students are strongly encouraged to co-enroll in BIOE 4150 (6150 if pursuing BS/MS degree) during their first semester of BIOE 4910.

In BIOE 4910, students will perform a review of relevant peer-reviewed literature, conduct a mentored research project, and present their findings in a poser or oral presentation (final semester) during the department's research day near the end of each semester. During their final semester of BIOE 4910, students must prepare a senior thesis including the background, methods, results, and conclusions of the research project that must be approved by the faculty advisor and the department Honors Committee. Six credits of BIOE H 4910 may be used to satisfy the BIOE Technical Requirements within the Bioengineering curriculum.

Biosystems Engineering

Departmental Honors in Biosystems Engineering requires the following sequence of courses totaling 7 credit hours:

BE	3000	Biosystems Engineering Honors Seminar (0)
	3010	Biosystems Engineering Thesis Research (3)
	4000	Biosystems Engineering Honors Thesis (3)
	4510	Newman Seminar & Lecture Series in Natural Resources Engineering (1)

To be eligible for Departmental Honors in Biosystems Engineering you must have a minimum overall GPA of 3.5 and a written recommendation by two faculty members in the Biosystems Engineering (BE) program. One of the recommending faculty members must be willing to serve as the advisor for the thesis. The faculty advisor and student must provide a general topic area and statement of available and required resources to complete the thesis in the required time period.

In BE 3000, taken during the fall semester of the junior year, students are introduced to current faculty research. Project ideas are then developed to prepare students in choosing a research topic for the senior honors thesis. Students are required to attend senior honors thesis presentations. The research will begin during the spring semester of the junior year with B E 3010. In the first semester of your senior year, you will enroll in BE 4000 and take BE 4510 during your final semester.

During the research/thesis process you will review the literature pertinent to the research topic, conduct a research program, develop a portfolio, and present a summary of the background analysis and results of the project in the form of a senior thesis which must be approved by your faculty advisor. You are also required

to make a presentation of your research program in a public seminar and to submit one copy of your thesis to the Honors Office. The ***final version*** of the thesis must be submitted to the advisor by the last day of finals week of the fall semester of the senior year.

Chemical Engineering
Departmental Honors in Chemical Engineering requires the following sequence of courses totaling 8 credit hours:

CHE	3000	Honors Seminar (1)
	3950	Honors Research I (3)
	4950	Honors Research II (3)
	4970	Honors Thesis (1)

Students in the Chemical Engineering Departmental Honors program will conduct a major research project under the direction of a faculty member and write an honors thesis. In the first semester of the junior year honors students take CHE 3000. To earn this pass/fail credit honors students attend the department's CHE 8950 graduate seminar and meet individually with faculty members to learn about research opportunities in chemical engineering. By the end of the semester students select a research topic and faculty advisor. In the next two semesters honors students take CHE 3950 and CHE 4950. In these lab courses the students conduct research, write progress reports, and review their results periodically with their faculty advisor. In CHE 4950 each student presents a seminar before the faculty, graduate students and other honors students taking CHE 3000. In the last semester of the senior year the student registers for CHE 4970 and writes an honors thesis. With the approval of the faculty research advisor the exact timing of the honors sequence can be adjusted to accommodate students who are also involved in the cooperative education program.

Civil Engineering (three options)
Option one: Honors Thesis Option for students in the BS Degree Program in Civil Engineering requires the following sequence of courses totaling 7-8 credit hours:

CE	3880	Honors Research Topics (1)
	3890	Honors Research Skills (1)
	4880	Honors Research I (2-3)
	4890	Honors Research II (3)

Honors students in the Civil Engineering Departmental Honors program generally take CE 3880 and CE 3890 in the junior year. These courses are designed to prepare students for the senior-year thesis, which consists of CE 4880 and CE 4890. This sequence allows Civil Engineering honors students the opportunity to carry out a major research project under the direction of a selected faculty member. Students must complete an Honors Research Thesis and an oral defense of the thesis attended by the student's faculty advisor, Civil Engineering Honors Coordinator and other interested faculty and students.

Option two: Research Option for students in the BS/MS Degree Program in Civil Engineering requires the following sequence of courses totaling 7-8 credit hours:

CE	3880	Honors Research Topics (1)
	3890	Honors Research Skills (1)
	4880	Honors Research I (2-3)
	4890	Honors Research II (3)

Students must complete a research proposal including any preliminary research needed to reasonably define the scope and methodology of the proposed research. The research project will have the scope of activity normally associated with an MS thesis.

The expect outcome includes a research proposal, including an introduction of the problem statement, literature review, research methodology and sufficient preliminary results to validate the intended study. The student will also be required to give a proposal presentation attended by the student's faculty advisor, Civil Engineering Honors Coordinator and other interested faculty and students.

Option three (Portfolio Option): Completion of four Honors Projects, typically one project completed each semester during a student's junior and senior years (enroll in courses listed below for a total of 4-6 credit hours). If necessary, a student can complete multiple projects in a single semester to complete four projects in less than four semesters.

CE	3870	Junior Honors Project (1-3) for a total of two-three credit hours over a period of two semesters
	4870	Senior Honors Project (1-3) for a total of two-three credit hours over a period of two semesters

The Honors portfolio, containing all completed honors projects, will be presented to the Civil Engineering Honors Program Coordinator and participating faculty for review and comment.

Computer Science

Departmental Honors in Computer Science requires the following sequence of courses totaling 7-8 credit hours:

CPSC	3950	Honors Seminar (1) (up to two semesters – one is required)
	4950	Senior Honors Research for a total of six credit hours over a period of two semesters (1-3)

The Departmental Honors program in Computer Science consists of a junior-year honors seminar and a senior-year honors thesis. In each semester of the junior year honors students must take CPSC H3950, a one-credit course designed to introduce students to the research interests of the faculty and to suggest possible topics for the senior thesis. By the end of the second semester of CPSC H3950 the student is expected to have chosen a thesis topic and a research advisor.

After completing the junior honors seminar, the student will complete an honors thesis while enrolled in two semesters of CPSC H4950 for a total of six credits. Upon completion of the written thesis, the student is expected to make a presentation to an open seminar attended by Computer Science faculty and honors students.

Electrical and Computer Engineering

Departmental Honors in Electrical and Computer Engineering requires the following sequence of courses totaling 10 credit hours:

ECE	3000	Junior Honors Seminar (1)

At least 5 credits from the following ECE courses:

2010 Logic and Computing Devices (2 credits)
2020 Electric Circuits I (3 credits)
2620 Electric Ciruits II (3 credits)
3170 Random Signal Analysis (3 credits)
3200 Electronics I (3 credits)
3300 Signals, Systems and Transforms (3 credits)

*At least three of these credits must be from ECE 3170 or ECE 3300

Four additional credits:

4910 Undergraduate Honors Research for a total of four credit hours over a period of two semesters (1-6)

Or a combination of the following (4 credits):

2990 Creative Inquiry in Electrical and Computer Engineering (1-4) up to 1 credit
3990 Creative Inquiry in Electrical and Computer Engineering (1-4) up to 1 credit
4990 Creative Inquiry in Electrical and Computer Engineering (1-4) 2-4 credits

The Departmental Honors Program in Electrical and Computer Engineering provides qualified students the opportunity to pursue a comprehensive research project under the supervision of a faculty advisor.

In your junior year you will take ECE 3300 and ECE 3000 a seminar designed to introduce you to research activities within the department.

Students may select either of the following options associated with the honors thesis:

Option 1 – Honors Thesis: This option includes four credits of ECE 4910 taken in the senior year. You will be required to do a literature survey of your chosen topic and to develop a research plan that will evolve into a senior thesis. Research will be performed under the direction of a faculty advisor. The honors thesis must meet the standards of the faculty advisor and the Clemson University Honors College, and you will be required the Honors Office with a copy of your thesis.

Option 2 – Creative Inquiry with Honors Thesis: This option includes four credits of one or a combination of the following courses: ECE 2990 (up to 1 credit) ECE 3990 (up to 1 credit); and ECE 4990 (2-4 credits) The Creative Inquiry (CI) courses may be taken in the sophomore, junior or senior year. You will work with a faculty advisor individually or as a member of a research team. The CI program has been designed to promote your reasoning and critical thinking skills, ethical judgment, and communication skills as well as a deep understanding of the methods of scientific research. This option may get you involved in research activities earlier, and well lead to an honors thesis. The honors thesis must meet the standards of the faculty advisor and the Clemson University Honors College, and you will be required the Honors Office with a copy of your thesis.

Note: The credit hours associated with ECE 4990 and ECE 4910 can be used to satisfy up to 3 credits of the technical elective requirements of the Electrical Engineering curriculum or the Computer Engineering curriculum.

Environmental Engineering

For the BS degree in Environmental Engineering, Departmental Honors in Environmental Engineering requires the following four-course sequence totaling 8 credit hours:

EES 3000 Honors Seminar: Introduction to Research in Environmental Engineering (1)

EES 3010 Honors Research in Environmental Engineering I (3)
EES 4000 Honors Research in Environmental Engineering II (3)
EES 4950 Honors Thesis in Environmental Engineering (1)

Students who are interested in earning Departmental Honors are encouraged to contact a faculty member in EES who is willing to supervise these courses. Arrangements should be made prior to the start of a student's junior level courses.

Students who are not members of the Honors College may apply to join, if their cumulative GPR is 3.5 or higher by the end of the semester that they apply. The purpose of Departmental Honors is to provide Honors Students a unique opportunity to do advanced, in-depth study and research within their major academic disciplines.

Geology

Departmental Honors in Geology requires the following sequence of courses totaling 12 credit hours:

GEOL 4110 Research Problems for a total of six credit hours taken under a single research advisor over a period of two semesters (1-3)

Two courses selected from the following:

GEOL 3000 Environmental Geology (3)
3020 Structural Geology (4)
3140 Sedimentary Petrology (3)
3160 Igneous and Metamorphic Petrology (3)
3750 Bahamian Field Study (3)
4080 Geohydrology (3)

Industrial Engineering

Departmental Honors in Industrial Engineering requires the following sequence of courses totaling 7 credit hours:

I E 2680 Creative Inquiry Seminar in Industrial Engineering (1)
4000 Honors Thesis (1-6) for a total of six credit hours over a period of two or more semesters

The Departmental Honors Program in Industrial Engineering provides students with an opportunity to engage in research under the guidance of a faculty advisor. If the research ultimately proves fruitful, it is disseminated to the professional community via presentations, publications, or both. In addition, opportunities exist for students to participate in local and national research competitions.
A student receives academic credit for the research through a series of courses. The first in the series is IE 2680, a course in which honors students become familiar with current research in industrial engineering and begin groundwork for their own research; IE 268 is one credit hour. As the work progresses, students enroll in IE 4000. IE 4000 is a variable hour course that may be taken two or more times, in multiples of one hour, for a total of six credits. Since IE 4000 is a variable hour course, it affords students considerable flexibility. Moreover, the research hours may be substituted for six credits of the Department's technical elective requirement. While enrolled in IE 4000, the research project is defined and developed, and ultimately culminates in the form of an honors thesis. Upon successful completion of the honors thesis, it

must be submitted both to the Clemson University Honors College and the Department's Honors Coordinator. In addition, the Department requires an abstract and a profile, examples of which may be found on the Department's Honors Program Web site (theses of former honors students may be found there as well).

Finally, IE 600 is also an option for those students in the Combined Bachelor's/Master's Program in Industrial Engineering. In addition to the requirements for IE 4000, requirements for IE 6000 include first forming a thesis committee (consisting of your mentor, the Honors Coordinator and at least one other faculty member), and subsequently presenting both a preliminary proposal defense and final thesis defense to this committee. Thus the IE 6000 requirements more closely parallel those of a master's thesis.

Materials Science and Engineering

Departmental Honors in Materials Science and Engineering requires the following sequence of courses totaling 7 credit hours:

MSE	3910**	Undergraduate Research Fundamentals (1) - Honors Section
	4910	Undergraduate Research (2)- Honors Section
	4950	Honors Research II (3)
	4970	Honors Thesis (1)

During this research sequence, students will have the opportunity to conduct research over four semesters with a faculty research mentor. The research project will begin in MSE 3910, normally taken in the first semester of the junior year. Students will attend weekly meetings to gain basic skills needed to conduct research within the field of materials science and engineering, identify a faculty research mentor and outline their research objective/hypothesis. Students will also be asked to attend graduate research seminars. In most cases, the research faculty member will be from the Department of Materials Science and Engineering. If a student wishes to pursue a materials science research project with a faculty member outside of the department, it must be approved by the instructor of MSE 3910. Students will continue their research project by enrolling in MSE 4910 (Spring semester junior year) and MSE 4950 (Fall semester of the senior year). It is expected that students will gain more independence as they progress through these classes. During the Spring semester of the senior year, the honors student will write their honors thes is based on the research done in MSE 3910, MSE 4910 and MSE 4950 while enrolled within MSE 4970.

These changes are effective for students starting at Clemson in the Fall of 2019.

** This class was previously numbered 4810.

Mechanical Engineering

Departmental Honors in Mechanical Engineering requires the following sequence of courses totaling 6 credit hours:

ME	3000	Junior Honors Seminar (0) taken both semesters of your junior year
	4150	Undergraduate Research (1-3) for a total of six credit hours over a period of two semesters

The Departmental Honors program in Mechanical Engineering provides outstanding students an opportunity to conduct in-depth research under the guidance of a faculty advisor. In your junior year you must participate in ME 3000 that introduces you to the spectrum of research activities in the department.

By the end of your junior year you must have identified a specific research project, with the approval of your chosen faculty advisor.

During your senior year you must satisfactorily complete a senior research thesis while enrolled in two semesters of ME 4150. The six credits of ME 4150 are accepted for the technical electives required by the mechanical engineering curriculum. You will review the literature pertinent to the research topic, conduct a research program, and present a summary of the background analysis and results of the project in the form of a senior thesis which must be approved by your faculty advisor and the department Honors Committee. You are also required to make a presentation of your research program in a public seminar and to submit one copy of your thesis to the Honors Office.