

# Faculty Mentor Handbook

MAE Department  
NC State University

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## Developing a Four–Year Career Success Plan in MAE

### Sophomore year

- Speak with your Faculty Mentor about your career aspirations
- Consider joining a student organization related to your career interests  
<https://www.mae.ncsu.edu/student-organizations/>
- Be open to future leadership opportunities
- Speak with your Faculty Mentor about research and internship opportunities  
<https://careers.dasa.ncsu.edu/>
- Attend career fairs and events to learn about internships and co-op, register on Epack  
<https://careers.dasa.ncsu.edu/gain-experience/career-fairs/>  
<https://careers.dasa.ncsu.edu/using-epack/> (job listings)
- Update your Online Portfolio (MAE 200 and 250) with class and extracurricular projects
- Make sure all of your social media/correspondences are very professional

### Junior year

- Speak with your Faculty Mentor about your career aspirations. Begin the discussion about post-undergraduate school opportunities – industry and government jobs, and graduate school.
- Consider leadership opportunities in your extra-curricular activities
- Attend career fairs and other career-related events  
<https://careers.dasa.ncsu.edu/gain-experience/career-fairs/>
- Begin to identify mentors who can serve as positive references of your character and accomplishments
- Continue to add noteworthy accomplishments in your portfolio and update your resume

### Senior year

- Speak with your Faculty Mentor about your career aspirations. Begin the discussion about your job search strategies.
- If looking to further your education, schedule your GRE exam and complete applications for graduate school. If seeking employment, begin your active job search.
- Consider taking the FE exam  
<https://www.engr.ncsu.edu/academics/undergrad/profengr/>
- Prepare your Online Portfolio and resume' for interviews
- Collect references and hone your interviewing skills

## **What should you be doing Sophomores?**

1. What are your career interests?
  - What kind of a job do you see yourself getting in a few short years?
  - Are you interested in graduate school?
  - Consider taking one of the assessments like Myers Briggs at the career center.
2. How do you find out about your field?
  - Join a student organization.
  - Look into a co-op or internship. (see pg 37)
    - Sign up for ePack. Google ePack or <https://careers.dasa.ncsu.edu/using-epack/>
    - Go to a co-op orientation meeting. (Need 30 credits, 2.5 gpa, coda into department.)
    - If you hold an F-1 Visa, you should attend CPT training.
  - Think about pursuing undergraduate research opportunities.
  - Go to the Career Fair! (see pg 40)
    - Take copies of your resume.
    - Dress professionally.
    - Speak to companies about co-op and internship possibilities.
  - Consider interviewing people with the job you think you want.
  - Read up on the professional ethics of your field.
3. What is your four-year plan?
  - Are you on-track with your studies?
  - Have you looked into the tracks the MAE offers?
  - What technical electives are you interested in shooting for?
4. Have you go your “stuff” together?
  - Consider a career assessment or counseling with the Career center. (pg 6)
  - Start keeping track of what would go a resume. (samples in book)Make a rough-draft resume and get it looked over at the Career Center.
  - Document your relationships and contacts as you make them. (pg 6)
  - Update or create your online portfolio
  - Practice interviewing skills. (see pg 32)
  - Make it one of your foals to learn about good team work skills.
5. Start looking for leadership opportunities.
  - Consider being a Career Ambassador at the Career Center.
  - Position yourself as a potential leader in a student organization.
  - If you’re really good, look toward being an MAE ambassador. Found out what that entails.
6. Start behaving like a professional
  - What does your work say about you?
  - What image do you want to show the world?
  - What is your social media persona? (Employers will look.)
  - Create a Linkedin account. Separate this from your Facebook/Instagram/Tumblr/Twitter.
7. Go over you answers to the above with your academic advisor.

## **What should you be doing Juniors?**

1. What are your career interests?
  - What kind of a job do you see yourself getting in one year?
  - Are you interested in graduate school?
    - What are the applications time lines?
  - Consider taking one of the assessments like Myers Briggs at the career center.
2. How do you find out about your field?
  - Join a student organization. If you have already joined, try to move into leadership.
  - Look into a co-op or internship. (see pg 37)
    - Sign up for ePack. Google :ncsu epack
      - Make sure you look out for on-campus interview announcements there.
    - Go to a co-op orientation meeting. Even if you think it's too late, go anyway.
    - If you hold an F-1 Visa, you should attend CPT training
    - Apply for internships in ePack
  - Make sure you look into undergraduate research opportunities.
  - Go to the career fair (See pg 40)
    - Take copies of your resume.
    - Dress professionally.
    - Speak to companies about co-op and internship possibilities.
  - Consider interviewing people with the job you think you want. (pg 6)
  - Meet with faculty who you think you might want to write you recommendation letters before you actually need them.
  - Read up on the professional ethics of your field.
3. What is your five0year plan for your life?
  - Are you on-track with your studies? What technical electives are you interested in shooting for? Will you use one of the tracks we've laid out for you?
  - What are you going to do after school?
  - Identify your goals and desires. Write them down.
4. Have you go your "stuff" together?
  - Meet with a career counselor at the career center.
  - Start keeping track of what would go on a resume. (Samples in book) Make a rough-draft resume and get it looked over at the career center.
  - Document your relationships and contacts as you make them. (pg 6) Start considering finding a mentor.
  - Update or create your portfolio. You'd be amazed how fast you'll forget.
  - Practice interviewing skills. (see pg 32)
  - Make it one of your goals to learn about team work skills.
  - Attend career center launch seminars.
  - Consider e-490, the FE prep course.
5. Start looking for leadership opportunities.
  - Consider being a Career Ambassador at the Career Center.
  - Position yourself as a potential leader in a student organization.
  - If you're really good, look toward being an MAE ambassador. Find out that that entails.
6. Start behaving like a professional.
  - What does your work say about you?
  - What image do you want to show the world?
  - What is your social media persona? (Employers will look.)
  - Create a LinkedIn account. Separate this from your Facebook/Instagram/Tunblr/Twitter.
7. Go over your answers to the above with your academic advisor.

## **What should you be doing Seniors?**

1. What do you want to do with your life?
  - How will you deal with it if you can't have that?
  - How will you deal with it if you change your mind?
  - Consider taking one of the assessments like Myers Briggs at the career center.
2. What should you do now? Whether you're heading for a job, the military or graduate school, do all of these things now to save yourself headaches later.
  - Make sure your resume is perfect; Get it proofed at the Career Center. (samples in book, see pg 25) You will need this sooner or later.
  - Practice writing cover letters. Write a different one for each job. Get at least one of them commented on at the Career Center before you graduate. (Even if you're going to graduate school.)
  - If you have even one semester more, make sure you've gotten involved in some undergraduate research project.
  - Decide who you will ask for recommendations. Meet with them before you need the letters. See extra information about how to ask for a letter.
  - Start behaving like a professional.
    - What does your work say about you?
    - What image do you want to show the world?
    - What is your social media persona? (Employers will look.)
    - Create a LinkedIn account. Separate this from your Facebook/Instagram/Tumblr/Twitter. Make very sure it's portraying you are your best. (See pg 38)
    - Make it one of your goals to learn about good team work skills.
  - Update your portfolio. You'd be amazed how fast you forget what you did.
  - Take advantage of student rates to join professional organizations.
  - Continue to document your relationships and contacts as you make them. (pg 6)
  - Set up a professional voice mail.
  - Speak with faculty (more than just me) about your plans and desires.
  - Make a five-year plan: what do you want to do or have happen in the next five years? Spell out your fears and what you can do to mitigate them.
  - Take the FE exam. Really. Take the review course E-490, and then take the exam.
  - Understand the professional ethics of your field.
3. If you're looking for a job,
  - Career Fair! Almost 54% of the seniors from last year reported using the Career Fair to help get/locate a job. (see pg 40).
  - Update your ePack account. Visit this often. 31% of our seniors reported using ePack to help get/locate job.
    - Go to every employer-information session you can get to. (Listed in ePack.)
  - Start actively looking at least one semester prior to graduation. Keep really good records of who you talk to, etc.
  - Go to a career counselor and discuss your job search strategies. (see pg 36)
  - Practice your interviewing skills. Family/friends are good for this. Or a career counselor. (see pg 32)
  - Attend Career Center Launch seminars.
4. If you're hoping to go to graduate school,
  - Start attending as many presentations as you can fit into your schedule.
  - Schedule your GRE if you haven't already.
  - Make sure you read at least two journal papers in the area you're interested in before you get to grad school.
  - Understanding the difference between a resume and a CV. (see pg 25)

## Student Organizations

**Aerial Robotics Club (ARC)**

<https://art1.mae.ncsu.edu/>

**Alpha Omega Epsilon Engineering Sorority (ΑΩΕ)**

<https://getinvolved.ncsu.edu/organization/aoegamma>

**American Indian Science and Engineering Society (AISES)**

<https://getinvolved.ncsu.edu/organization/aises>

**American Institute of Aeronautics and Astronautics (AIAA)**

<https://getinvolved.ncsu.edu/organization/AIAA>

**American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)**

<https://orgsync.com/96918/chapter>

**American Society of Mechanical Engineers (ASME)**

[https://getinvolved.ncsu.edu/organization/NCSU\\_ASME](https://getinvolved.ncsu.edu/organization/NCSU_ASME)

**Engineering Ambassadors (EA)**

<https://www.engr.ncsu.edu/academics/undergrad/engineering-ambassadors/>

**Engineering Entrepreneurs Program (EEP)**

<http://eep.ncsu.edu>

**Engineers Without Borders (EWB)**

<https://getinvolved.ncsu.edu/organization/EWB>

**Engineers' Council (EC)**

<https://ncsuengineerscouncil.wordpress.com/>

**High Power Rocketry Club (HPRC)**

<https://getinvolved.ncsu.edu/organization/TachoLycos>

**Mechanical and Aerospace Engineering Graduate Student Association (MAEGSA)**

<https://getinvolved.ncsu.edu/organization/426>

**National Society of Black Engineers (NSBE)**

<https://getinvolved.ncsu.edu/organization/nsbe>

**Pi Tau Sigma Mechanical Engineering Honor Society (ΠΤΣ)**

<https://getinvolved.ncsu.edu/organization/pitausigma>

**Professional Engineers of North Carolina (PENC)**

<https://getinvolved.ncsu.edu/organization/PENC>

**Sigma Gamma Tau Honor Society for Aerospace Engineers (ΣΓΤ)**

[https://getinvolved.ncsu.edu/organization/sigma\\_gamma\\_tau](https://getinvolved.ncsu.edu/organization/sigma_gamma_tau)

**Society of Hispanic Professional Engineers (SHPE)**

<https://getinvolved.ncsu.edu/organization/shpencsu>

**Society of Manufacturing Engineers (SME)**

<https://getinvolved.ncsu.edu/organization/633>

**Society of Women Engineers (SWE)**

<https://getinvolved.ncsu.edu/organization/swe>

**Students for the Exploration and Development of Space (SEDS)**

<https://getinvolved.ncsu.edu/organization/sedsatncstate>

**Tau Beta Pi (ΤΒΠ)**

<https://getinvolved.ncsu.edu/organization/tbp>

**Theta Tau Professional Engineering Fraternity (ΘΤ)**

<https://getinvolved.ncsu.edu/organization/thetatau>

**Underwater Robotics Club (URC)**

<https://getinvolved.ncsu.edu/organization/URC>

**Wolfpack Motorsports (WMS)**

<https://getinvolved.ncsu.edu/organization/Motorsports>

**Women in Mechanical and Aerospace (WIA)**

<https://getinvolved.ncsu.edu/organization/wima>



## **How to Ask a Faculty Member for a Recommendation**

If at all possible, go in person to ask for a recommendation. Ideally our first communication would simply be you asking if I have time and would be willing to recommend you.

If you have to re-introduce yourself, you're probably asking the wrong person.

Do not tell the company or government organization that so-and-so will be one of your evaluations until you have his or her OK.

Leave sufficient time between your request and the due date. Some people recommend 5-6 weeks. If you have less than that, please indicate that right away.

After a faculty member (or anybody else) agrees to write a recommendation for you, the more organized you can be the easier it is. Here are ten things to send someone who is writing you a letter of recommendation.

1. the semester you took his or her class or times you worked in the lab (etc)
2. some information about what you're applying for.  
(What would you be doing and why do you want to do it?)
3. the due date
4. an up-to-date unofficial transcript and resume
5. a name of the person to whom the letter should be addressed  
(If you don't have a name, your letter is less effective -- "Dear Sir or Madam" -- but you can at least provide the name of the organization.)
6. an address  
(Even if it is an online evaluation, the organization has an address for a letter.)
7. a link to the organization portal if the evaluation is online  
(If the organization will send a link to fill it out, when should I expect it?)
8. your application code if you have one (Programs need some way to match my letter to your application. They almost all have some different way of doing this.)
9. the paper evaluation form (if you need a paper form filled out)
10. a paragraph or two about yourself (Why should this organization pick you instead of someone else? Is there anything else about you that I should know?)

# Career Development Center

Get familiar with the NCSU Career Development Center at: <https://careers.dasa.ncsu.edu/>

## ePack

<https://careers.dasa.ncsu.edu/using-epack/>

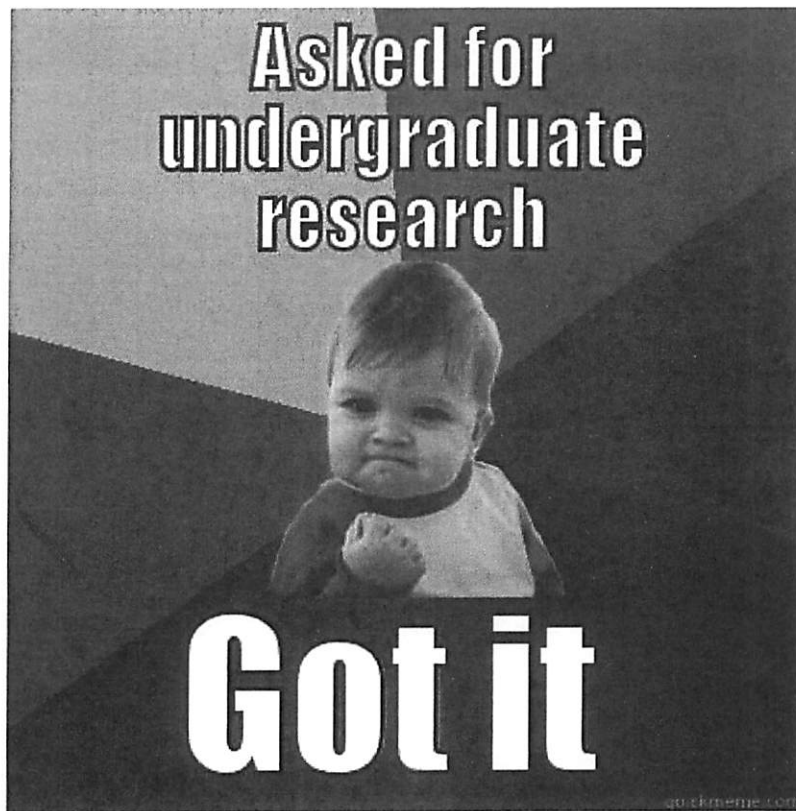
ePACK is the university-wide system that posts jobs and internships and connects students with employers. ePack allows students to do the following:

- Upload resumes electronically
- Apply for Jobs and internships
- Sign up for on-campus interviews
- View a calendar of career related events
- View employers using the employer database

Make sure you're using this to the best extent possible. One survey suggested that 31% of out graduates got their job via ePack. This is not a negligible number!

Make very sure you go by the Career Development Center before you interview.

Take the GRE and the FE exam even if you think you won't need them.



#### Undergraduate Research:

There is not really a one-stop-shop to find out about undergraduate research in MAE. Undergraduate research is often student-initiated, meaning students approach a faculty member of their choice about doing research. Occasionally, a faculty member will solicit undergrads for research, but that happens less often.

When a student asks about how to find a research project or faculty member to work with, I tell them to walk around the 3rd and 1st floors of EB3 and look at the posters on the walls to get an idea of the kind of research going on. When they see something that peaks their interest, note the name of the professor on the poster. Find out when his/her office hours are; go in and ask an intelligent question about that poster. Ask about the possibilities of getting involved with that research. Even if you are volunteering your time at the beginning, such an opportunity can be life-altering.

To get course credit for undergrad research (MAE 496), students need to have completed the majority of their junior-level MAE courses. Pick up an MAE 496 permission form from the undergraduate office and have the faculty member sign it. MAE 496 counts as a tech elective for MAE, and students can use up to two MAE 496 credits toward electives for both ME and AE.

There have been five Undergraduate Research Speed Data-ing events in recent Februarys. Look for this in the spring.

## Linked in

Linked-In Profile? Make one. :)

Include a photo, a description of you. Keep this separate from your other social media.

The Career Development Center put this together. I'm not sure I buy listing all your courses, but these are some things to think about.

- **PHOTO:** It doesn't have to be fancy – just use your cellphone camera in front of a plain background. Wear a nice shirt and don't forget to smile!
- **HEADLINE:** Tell people what you're excited about now and the cool things you want to do in the future.
- **SUMMARY:** Describe what motivates you, what you're skilled at, and what's next.
- **EXPERIENCE:** List the jobs you held, even if they were part-time, along with what you accomplished at each. Even include photos and videos from your work.
- **ORGANIZATIONS:** Have you joined any clubs at school or outside? Be sure to describe what you did with each organization.
- **EDUCATION:** Starting with college, list all educational experiences you've had including summer programs.
- **SKILLS & EXPERTISE:** Add at least 5 key skills - and then your connections can endorse you for the things you're best at.
- **HONORS & AWARDS:** If you earned a prize in or out of school, don't be shy. Let the world know about it!
- **COURSES:** List the classes that show off the skills and interests you're most excited about.
- **PROJECTS:** Whether you led a team assignment in school or built an app on your own, talk about what you did and how you did it.
- **RECOMMENDATIONS:** Ask managers, professors, or classmates who've worked with you closely to write a recommendation. This gives extra credibility to your strengths and skills.

# Aerospace Engineering (14AEBS Req Term Summer 2017)

				Freshman Year			
Fall Semester			Credits	Spring Semester			Credits
CH	101	Chemistry, A Molecular Science <sup>1</sup>	3	CSC	113	Intro Comp MATLAB	3
CH	102	General Chemistry Lab <sup>1</sup>	1	GC	120	Foundations of Graphics	3
E	101	Introduction to Engr & Prob Solv <sup>1,2</sup>	1	MA	241	Calculus II <sup>1</sup>	4
E	115	Intro to Computing Environ <sup>1,2</sup>	1	PY	205	Physics for Engr & Sc I <sup>1</sup>	3
ENG	101	Academic Writing and Research <sup>1,2</sup>	4	PY	206	Physics for Engr & Sc I <sup>1</sup> Lab	1
MA	141	Calculus I <sup>1</sup>	4	HES	***	Health & Exercise Studies	1
EC	205	Economics (or EC 201 or ARE 201)*	3	E	102	Engineering in the 21st Cent	2
HESF	10*	Fitness & Wellness	1				
Semester Total			18	Semester Total			17

Sophomore Year							
Fall Semester			Credits				
			Spring Semester		Credits		
MA	242	Calculus III	4	MA	341 Applied Differential Eq	3	
MAE	206	Engineering Statics <sup>2</sup>	3	MAE	208 Engineering Dynamics <sup>2</sup>	3	
MAE	250	Introduction to Aerospace Engineering	1	MAE	214 Solid Mechanics <sup>2</sup>	3	
MAE	251	Aero Vehicle Perf <sup>2,3</sup>	3	MAE	252 Aerodynamics I	3	
PY	208	Physics for Engr & Sc II	3	MAE	253 Experimental Aerodynamics I	1	
PY	209	Physics for Engr & Sc II Lab	1	***	***	GEP Requirement*	3
Semester Total			15	Semester Total		16	

Junior Year							
Fall Semester			Credits	Spring Semester		Credits	
MAE	201	Engr Thermodynamics f	3	MAE	351	Aerodynamics II	3
MAE	361	Dynamics & Controls	3	MAE	352	Experimental Aerodynamics II	1
MAE	371	Aero Struc I	3	***	***	Math Elective <sup>7</sup>	3
MAE	372	Aero Vehicle Struc Lab	1	***	***	GEP Requirement*	3
		English Elective <sup>d</sup>	3	MAE	***	Flight/Space Elective <sup>e</sup>	3
***	***	Ethics (GEP Requirement*) <sup>f</sup>	3	MAE	***	Structures Elective <sup>e</sup>	3
Semester Total			16	Semester Total			16

Senior Year				
Fall Semester			Spring Semester	
		Credits		Credits
MAE	405 Controls Lab	1	MAE 481 Aero Vehicle Design II	3
MAE	435 Princ of Automatic Controls	3	*** GEP Requirement*	3
MAE	451 Experimental Aerodynamics III	1	*** GEP Requirement*	3
MAE	480 Aero Vehicle Design I	3	MAE *** Flight/Space Elective <sup>6</sup>	3
MAE	*** Propulsion Elective <sup>6</sup>	3	MAE *** Technical Elective <sup>6</sup>	3
MAE	*** Technical Elective <sup>6</sup>	3		
Semester Total		14	Semester Total	15

Minimum Total Credit Hours Required for Graduation 127

## Major/Program requirements and footnotes:

<sup>1</sup>Courses required for Change of Degree Audit (CODA): CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher.

<sup>2</sup>Minimum grade of C-, E 115 requires satisfactory completion (S).

<sup>3</sup>Students must have a 2.0 GPA to enroll in this course.

<sup>4</sup>ENG 331 Comm Engr & Technology or other approved course.

<sup>5</sup>Select from IDS 201, STS 302, STS 304, STS 320, PHI 214, PHI/STS 325 or PHI 375

<sup>6</sup>**Flight/Space** (3 credit hours) Select either MAE 457 Flight Stability & Control or MAE 467 Intro to Space Flight; **Structures** (3 credit hours) Select either MAE 472 Aero Structures II or MAE 430 Applied Finite Element; **Propulsion** (3 credit hours) Select MAE 458 Propulsion or MAE 459 Rocket Propulsion; **Open** (6 credit hours) Select from approved lists: <https://www.mae.ncsu.edu/academics/undergraduate-programs/electives/>

<sup>7</sup>Math Elective (3 credit hours) Select either MA 305, MA 405, ST 305, ST 312, ST 370, ST 371, ST 372 or other approved course.

## \*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied.

University approved GEP course lists for each of the following categories can be found at <http://oucc.ncsu.edu/gep-courses>.

**Humanities** (6 credit hours selected from two different disciplines/course prefixes)  
Choose from the University approved GEP Humanities course list.

**Social Sciences** (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.

**Health and Exercise Studies** (2 credit hours – must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

**Additional Breadth** - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

**Interdisciplinary Perspectives** (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following **Co-Requisites** must be satisfied to complete the General Education Program requirements:

### I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

### J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

### K. Foreign Language proficiency - Proficiency at the FL\_102 level is required for graduation.

## Mechanical Engineering [14MEBS Req Term Summer 2017]

				Freshman Year			
		Fall Semester	Credits			Spring Semester	Credits
CH	101	Chemistry, A Molecular Science <sup>1</sup>	3	CSC	113	Intro Comp MATLAB	3
CH	102	General Chemistry Lab <sup>1</sup>	1	MA	241	Calculus II <sup>1</sup>	4
E	101	Introduction to Engr & Prob Solv <sup>1,2</sup>	1	PY	205	Physics for Engr & Sc I <sup>1</sup>	3
E	115	Intro to Computing Environ <sup>1,2</sup>	1	PY	206	Physics for Engr & Sc I <sup>1</sup> Lab	1
ENG	101	Academic Writing and Research <sup>1,2</sup>	4	GC	120	Foundations of Graphics	3
MA	141	Calculus I <sup>1</sup>	4	HESF	10*	Fitness & Wellness Course*	1
EC	205	Economics (or EC 201 or ARE 201)*	3	E	102	Engineering in the 21st Cent	2
HES	***	Health & Exercise Studies	1				
<b>Semester Total 18</b>				<b>Semester Total 17</b>			

				Sophomore Year			
		Fall Semester	Credits			Spring Semester	Credits
MA	242	Calculus III	4	MA	341	Appl Differential Eq	3
MAE	200	Introduction to ME Design <sup>3</sup>	1	MAE	201	Engr Thermodynamics I <sup>2</sup>	3
MAE	206	Engineering Statics <sup>2</sup>	3	MAE	305	ME Lab I	1
PY	208	Physics for Engr & Sc II	3	MAE	208	Engineering Dynamics <sup>2</sup>	3
PY	209	Physics for Engr & Sc II <sup>1</sup> Lab	1	MAE	214	Solid Mechanics <sup>2</sup>	3
ST	370	Prob & Stat for Engineers (or ST 371)	3	***	***	GEP Requirement*	3
***	***	GEP Requirement*	3				
<b>Semester Total 18</b>				<b>Semester Total 16</b>			

				Junior Year			
		Fall Semester	Credits			Spring Semester	Credits
ENG	331	Comm Engr & Tech	3	ECE	331	Principles of Elec. Engr. I	3
MAE	302	Engr Thermodynamics II	3	MAE	310	Heat Transfer Fundamentals	3
MAE	306	ME Lab II	1	MAE	316	Strength of Mech Comp	3
MAE	308	Fluid Mechanics	3	MSE	200	Mech. Prop. Engr. Materials (or MSE 201)	3
MAE	315	Dynamics of Machines	3	**E	***	Tech Elective <sup>4</sup>	3
***	***	GEP Requirement*	3				
<b>Semester Total 16</b>				<b>Semester Total 15</b>			

				Senior Year			
		Fall Semester	Credits			Spring Semester	Credits
MAE	405	Controls Lab	1	**E	***	Tech Elective <sup>4</sup>	3
MAE	435	Prin of Auto Control	3	MAE	416	ME Senior Design <sup>7</sup>	4
MAE	4**	Mech Engr Design Elective <sup>5</sup>	3	***	***	GEP Requirement*	3
**E	***	Tech Elective <sup>4</sup>	3	***	***	Ethics (GEP Req*) <sup>6</sup>	3
ISE	311	Engr Econ Analysis	3				
<b>Semester Total 13</b>				<b>Semester Total 13</b>			

**Minimum Total Credit Hours Required for Graduation 126**

### Major/Program requirements and footnotes:

<sup>1</sup>Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher.

<sup>2</sup>Minimum grade of C-, E 115 requires satisfactory completion (S).

<sup>3</sup>MAE 200 may be taken in the fall semester of the sophomore or junior year.

<sup>4</sup>Technical electives must be selected from the following list: <https://www.mae.ncsu.edu/academics/undergraduate-programs/electives/>

<sup>5</sup>Choose one: Either MAE 415 for traditional senior design or MAE 482 for Engineering Entrepreneurship senior design

<sup>6</sup>Select from IDS 201, STS 302, STS 304, STS(PHI) 325, PHI 214 or PHI 375.

<sup>7</sup>Students who choose MAE 482 for the Mech Engr Design Elective should enroll in MAE 483 + MAE 484 instead of MAE 416.

### \*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied.

University approved GEP course lists for each of the following categories can be found at

<http://oucc.ncsu.edu/gep-courses>.

**Humanities** (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list.

**Social Sciences** (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement

**Health and Exercise Studies** (2 credit hours – must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

**Additional Breadth** - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

**Interdisciplinary Perspectives** (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following **Co-Requisites** must be satisfied to complete the General Education Program requirements:

#### I. **U.S. Diversity** (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

#### J. **Global Knowledge** (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

#### K. **Foreign Language proficiency** - Proficiency at the FL\_102 level is required for graduation.

# COLLEGE OF ENGINEERING

## The Fundamentals of Engineering (FE) Exam

The FE exam is a computer-based exam designed and administered by the National Council of Examiners for Engineering and Surveying (NCEES).

The College of Engineering offers E 490, a formal review course to help prepare graduating seniors for the FE exam.

There will never be a better time for taking the FE exam than the final semester of your senior year when the fundamentals of engineering are still fresh in your mind. The passing rate for seniors at NC State is typically better than 85%. Those who take it later have a passing rate below 45% and normally spend many hours trying to relearn material they once knew. If you are a graduating senior, take it now. But prepare yourself by taking E 490, the FE exam preparation course. The FE exam may be the most difficult exam you have ever taken. You should not take this exam unless you have taken at least 75% of the courses in your major. Even with this background, you must prepare.

## How should students prepare for Fundamentals of Engineering Exam?

1. Select electives at NC State that support the exam. In most engineering programs, students can choose electives, many of which support the FE exam. Examine the [NCEES information for engineers](#). Get help from your adviser.
2. Take the FE preparation course [E 490](#).
3. Take one or more trial examinations from [PPI](#) or [NCEES](#).
4. Download a free copy of the *Fundamentals of Engineering Supplied-Reference Handbook* at <http://ncees.org/exams/study-materials/download-fe-supplied-reference-handbook/>. Become familiar with it. This *Reference Handbook* is supplied to FE exam takers at the exam. Most questions on the exam concern topics covered in this handbook. The E 490 course teaches you how to use this handbook.
5. Study one of the many preparation manuals available from [NCEES](#) or [PPI](#).

## FE Preparation for Practicing Engineers

We recommend the following advice for those who are not currently enrolled at NC State:

1. If you have been out of college for more than a year and are a civil engineer, you should probably take the [FE Civil Discipline-Specific Review Course](#) offered by the Institute of Transportation Research and Education (ITRE) on the NC State campus. This in-depth course prepares you for the civil engineering exam.
2. Study one of the many preparation manuals available from [NCEES](#) or [PPI](#).
3. For further information, contact the E 490 instructor.

# Exam schedule

The FE and FS exams are offered year-round as computer-based exams at Pearson VUE testing centers. Learn more here. The PS exam will be administered in pencil-and-paper format for the last time in April 2016; it will be converted to a computer-based test after that, with the first appointments available in October 2016. The PE and SE exams, which are still pencil-and-paper exams, are scheduled as follows:

YEAR	PE, SE Vertical	SE Lateral
2016	Apr 15, Oct 28	Apr 16, Oct 29
2017	Apr 21, Oct 27	Apr 22, Oct 28
2018	Apr 13, Oct 26	Apr 14, Oct 27
2019	Apr 5, Oct 25	Apr 6, Oct 26
2020	Apr 17, Oct 23	Apr 18, Oct 24
2021	Apr 23, Oct 22	Apr 24, Oct 23
2022	Apr 22, Oct 21	Apr 23, Oct 22
2023	Apr 14, Oct 27	Apr 15, Oct 28
2024	Apr 12, Oct 25	Apr 13, Oct 26
2025	Apr 11, Oct 25	Apr 12, Oct 26

All PE exams are offered twice a year except for the following:

## **PE exams offered in April only**

Agricultural and Biological Engineering  
Architectural Engineering  
Industrial Engineering  
Naval Architecture and Marine Engineering  
Software Engineering

## **PE exams offered in October only**

Control Systems Engineering  
Fire Protection Engineering  
Metallurgical and Materials Engineering  
Mining and Mineral Processing Engineering  
Nuclear Engineering  
Petroleum Engineering





## *Code of Ethics for Engineers*

### **Preamble**

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

### **I. Fundamental Canons**

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

### **II. Rules of Practice**

1. Engineers shall hold paramount the safety, health, and welfare of the public.
  - a. If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.
  - b. Engineers shall approve only those engineering documents that are in conformity with applicable standards.
  - c. Engineers shall not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law or this Code.
  - d. Engineers shall not permit the use of their name or associate in business ventures with any person or firm that they believe is engaged in fraudulent or dishonest enterprise.
  - e. Engineers shall not aid or abet the unlawful practice of engineering by a person or firm.
  - f. Engineers having knowledge of any alleged violation of this Code shall report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required.
2. Engineers shall perform services only in the areas of their competence.
  - a. Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.
  - b. Engineers shall not affix their signatures to any plans or documents dealing with subject matter in which they lack competence, nor to any plan or document not prepared under their direction and control.
  - c. Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment.
3. Engineers shall issue public statements only in an objective and truthful manner.
  - a. Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.
  - b. Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.
  - c. Engineers shall issue no statements, criticisms, or arguments on technical matters that are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking, and by revealing the existence of any interest the engineers may have in the matters.

4. Engineers shall act for each employer or client as faithful agents or trustees.
  - a. Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services.
  - b. Engineers shall not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to by all interested parties.
  - c. Engineers shall not solicit or accept financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.
  - d. Engineers in public service as members, advisors, or employees of a governmental or quasi-governmental body or department shall not participate in decisions with respect to services solicited or provided by them or their organizations in private or public engineering practice.
  - e. Engineers shall not solicit or accept a contract from a governmental body on which a principal or officer of their organization serves as a member.
5. Engineers shall avoid deceptive acts.
  - a. Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates' qualifications. They shall not misrepresent or exaggerate their responsibility in or for the subject matter of prior assignments. Brochures or other presentations incident to the solicitation of employment shall not misrepresent pertinent facts concerning employers, employees, associates, joint venturers, or past accomplishments.
  - b. Engineers shall not offer, give, solicit, or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect or intent of influencing the awarding of a contract. They shall not offer any gift or other valuable consideration in order to secure work. They shall not pay a commission, percentage, or brokerage fee in order to secure work, except to a bona fide employee or bona fide established commercial or marketing agencies retained by them.

### **III. Professional Obligations**

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.
  - a. Engineers shall acknowledge their errors and shall not distort or alter the facts.
  - b. Engineers shall advise their clients or employers when they believe a project will not be successful.
  - c. Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment, they will notify their employers.
  - d. Engineers shall not attempt to attract an engineer from another employer by false or misleading pretenses.
  - e. Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.
2. Engineers shall at all times strive to serve the public interest.
  - a. Engineers are encouraged to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well-being of their community.
  - b. Engineers shall not complete, sign, or seal plans and/or specifications that are not in conformity with applicable engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.
  - c. Engineers are encouraged to extend public knowledge and appreciation of engineering and its achievements.
  - d. Engineers are encouraged to adhere to the principles of sustainable development<sup>1</sup> in order to protect the environment for future generations.

3. Engineers shall avoid all conduct or practice that deceives the public.
  - a. Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact.
  - b. Consistent with the foregoing, engineers may advertise for recruitment of personnel.
  - c. Consistent with the foregoing, engineers may prepare articles for the lay or technical press, but such articles shall not imply credit to the author for work performed by others.
4. Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.
  - a. Engineers shall not, without the consent of all interested parties, promote or arrange for new employment or practice in connection with a specific project for which the engineer has gained particular and specialized knowledge.
  - b. Engineers shall not, without the consent of all interested parties, participate in or represent an adversary interest in connection with a specific project or proceeding in which the engineer has gained particular specialized knowledge on behalf of a former client or employer.
5. Engineers shall not be influenced in their professional duties by conflicting interests.
  - a. Engineers shall not accept financial or other considerations, including free engineering designs, from material or equipment suppliers for specifying their product.
  - b. Engineers shall not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with clients or employers of the engineer in connection with work for which the engineer is responsible.
6. Engineers shall not attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper or questionable methods.
  - a. Engineers shall not request, propose, or accept a commission on a contingent basis under circumstances in which their judgment may be compromised.
  - b. Engineers in salaried positions shall accept part-time engineering work only to the extent consistent with policies of the employer and in accordance with ethical considerations.
  - c. Engineers shall not, without consent, use equipment, supplies, laboratory, or office facilities of an employer to carry on outside private practice.
7. Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.
  - a. Engineers in private practice shall not review the work of another engineer for the same client, except with the knowledge of such engineer, or unless the connection of such engineer with the work has been terminated.
  - b. Engineers in governmental, industrial, or educational employ are entitled to review and evaluate the work of other engineers when so required by their employment duties.
  - c. Engineers in sales or industrial employ are entitled to make engineering comparisons of represented products with products of other suppliers.
8. Engineers shall accept personal responsibility for their professional activities, provided, however, that engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the engineer's interests cannot otherwise be protected.
  - a. Engineers shall conform with state registration laws in the practice of engineering.
  - b. Engineers shall not use association with a nonengineer, a corporation, or partnership as a "cloak" for unethical acts.
9. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.
  - a. Engineers shall, whenever possible, name the person or persons who may be individually responsible for designs, inventions, writings, or other accomplishments.
  - b. Engineers using designs supplied by a client recognize that the designs remain the property of the client and may not be duplicated by the engineer for others without express permission.
  - c. Engineers, before undertaking work for others in connection with which the engineer may make improvements, plans, designs, inventions, or other records that may justify copyrights or patents, should enter into a positive agreement regarding ownership.
  - d. Engineers' designs, data, records, and notes referring exclusively to an employer's work are the employer's property. The employer should indemnify the engineer for use of the information for any purpose other than the original purpose.
  - e. Engineers shall continue their professional development throughout their careers and should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminars.

**Footnote 1** "Sustainable development" is the challenge of meeting human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future development.

### As Revised July 2007

"By order of the United States District Court for the District of Columbia, former Section 11(c) of the NSPE Code of Ethics prohibiting competitive bidding, and all policy statements, opinions, rulings or other guidelines interpreting its scope, have been rescinded as unlawfully interfering with the legal right of engineers, protected under the antitrust laws, to provide price information to prospective clients; accordingly, nothing contained in the NSPE Code of Ethics, policy statements, opinions, rulings or other guidelines prohibits the submission of price quotations or competitive bids for engineering services at any time or in any amount."

### Statement by NSPE Executive Committee

In order to correct misunderstandings which have been indicated in some instances since the issuance of the Supreme Court decision and the entry of the Final Judgment, it is noted that in its decision of April 25, 1978, the Supreme Court of the United States declared: "The Sherman Act does not require competitive bidding."

It is further noted that as made clear in the Supreme Court decision:

1. Engineers and firms may individually refuse to bid for engineering services.
2. Clients are not required to seek bids for engineering services.
3. Federal, state, and local laws governing procedures to procure engineering services are not affected, and remain in full force and effect.
4. State societies and local chapters are free to actively and aggressively seek legislation for professional selection and negotiation procedures by public agencies.
5. State registration board rules of professional conduct, including rules prohibiting competitive bidding for engineering services, are not affected and remain in full force and effect. State registration boards with authority to adopt rules of professional conduct may adopt rules governing procedures to obtain engineering services.
6. As noted by the Supreme Court, "nothing in the judgment prevents NSPE and its members from attempting to influence governmental action . . ."

**Note:** In regard to the question of application of the Code to corporations vis-a-vis real persons, business form or type should not negate nor influence conformance of individuals to the Code. The Code deals with professional services, which services must be performed by real persons. Real persons in turn establish and implement policies within business structures. The Code is clearly written to apply to the Engineer, and it is incumbent on members of NSPE to endeavor to live up to its provisions. This applies to all pertinent sections of the Code.



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## AIAA Code of Ethics Guidelines to Practice under the AIAA Code of Ethics

- 1. Hold paramount the safety, health, and welfare of the public in the performance of their duties.**
  - a. Recognize that the lives, safety, health and welfare of the public are dependent upon professional judgments, decisions and practices.
  - b. Seek opportunities to be of service in professional and civic affairs and work for the advancement of safety, health, and well-being of our communities.
  - c. Report suspected violations of this element of the code to the proper authority and cooperate in furnishing further information and assistance as required.
- 2. Promote the lawful and ethical interests of AIAA and the aerospace profession.**
  - a. Comply with public law and regulation.
  - b. Avoid the appearance of impropriety.
  - c. Report to employers, clients, or government, as appropriate, any matters believed to represent a contravention of law, regulation, health, safety or ethical standards.
  - d. Refrain from retaliating against those who make lawful reports about contraventions of law, regulation, health, or safety.
  - e. Promote fair and unbiased opportunities for all.
  - f. Charge fairly for services rendered and fulfill obligations as agreed – honoring contracts, agreements, and assigned responsibilities.
- 3. Reject bribery, fraud, and corruption in all their forms.**
  - a. Do not knowingly engage in business or professional practices of a fraudulent, dishonest, or unethical nature.
  - b. Promote the lawful and ethical interests of the AIAA and aerospace profession.
- 4. Properly credit the contributions of others, accept and offer honest and constructive criticism of technical work; and acknowledge and correct errors.**
  - a. Take care that credit for professional work and accomplishments are given to those to whom credit is properly due.
  - b. Accurately present and explain one's work and its merit, and avoid any act that would promote personal interests at the expense of the integrity, honor, and dignity of the profession.
  - c. Do not maliciously or indiscriminately criticize the work of another.
  - d. Perform comprehensive and thorough evaluations of technical work, addressing potential impacts and including analysis of possible risks.
- 5. Avoid harming others, their property, their reputations or their employment through false or malicious statements or through unlawful or otherwise wrongful acts.**
  - a. Perform professional work with care, thoroughness and accuracy.
  - b. Do not intentionally, recklessly, or repeatedly fail to perform services with competence.
  - c. Respect the intellectual, financial, personal and real property interests of others.
- 6. Issue statements or present information in an objective and truthful manner, based on available data.**
  - a. Reject all forms of research or testing misconduct and report all misconduct including fabrication, falsification, and plagiarism when it is observed.
  - b. Do not disseminate untrue, unsubstantiated, or exaggerated claims regarding technical matters.
  - c. Be objective, truthful, and complete in professional statements, professional reports, or expert testimony.
  - d. Express professional opinions only when founded on a background of technical competence.
  - e. Safeguard AIAA's reputation and integrity by ensuring that any public statements relating to AIAA which are not official statements of AIAA, are properly portrayed as the opinion of the individual making them.
- 7. Avoid real and perceived conflicts of interest, and act as honest and fair agents in all professional interactions.**