

ENGINEERING SUCCESS: A SEMINAR FOR FIRST-YEAR STUDENT



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Engineering Success: A Seminar for First-Year Students

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Topic 01. Time Management, Study Strategies, and Metacognition

Success in engineering education requires more than technical knowledge—it demands strong organizational skills, effective learning strategies, and the ability to reflect on and adapt your study habits. Developing these skills early in your academic journey sets the foundation for sustained success in both your studies and future career.

This chapter explores:

1. **The Importance of Time Management:** Understand how managing your time effectively contributes to achieving academic and personal goals, helping you stay organized and reduce stress.
2. **Effective Study Strategies:** Learn proven techniques to enhance learning and retention, enabling you to approach complex material with confidence.
3. **Metacognitive Skills Development:** Discover how reflecting on your learning processes and adapting your study habits can lead to improved performance and a deeper understanding of course material.
4. **Task Prioritization and Workload Management:** Gain practical skills in setting priorities, breaking down tasks, and balancing academic and personal responsibilities efficiently.

By mastering these skills, you will build a strong foundation for your academic success and establish habits that will benefit you throughout your engineering career.

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Topic 01: Time Management, Study Strategies, & Metacognition

Prof. J Lee

Objectives

Topic 01 – 1

- **Understand Time Management:**

- Identify key strategies for managing time effectively within the demands of an engineering program.
- Develop a personalized time management plan to balance academic responsibilities and personal commitments.

- **Learn Effective Study Methods:**

- Explore study techniques tailored to university-level engineering courses.
- Apply practical methods to enhance comprehension and retention of course material.

- **Introduction to Metacognition:**

- Define metacognition and its role in successful learning.
- Recognize the importance of self-reflection and self-regulation in academic success.
- Apply metacognitive strategies to improve study habits and problem-solving skills.

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How Do You Study **Now?**

- How do you currently study?
- What are your study strategies? How do you prioritize?
- What do you do pre and post exam?
- How long do you study?

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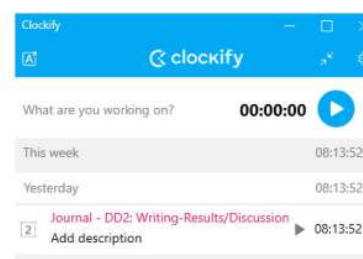
College Transition Can Be Difficult.

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- Start to learn and utilize Google Calendar, Drive, etc.
- You can also use a schedule organizer (i.e., Clockify) and many other time management apps
- Get organized and figure out how much time is needed for each class but also be sure to schedule some time for yourself, breaks are critical to re-charge

< > September 2024

SUN	MON	TUE	WED	THU	FRI
Sep 1	2	3	4	5	6
		7:30am CoursePrep 9am GEAR Subcommittee M 9am ENGR 210 3 more	8am Research 1pm Office Hour 2pm ENGR 210 4pm ENGR 210	7:30am CoursePrep 9am ENGR 210 10am Research 4 more	7:30am CoursePrep 9am ENGR 112 10am ENGR 112 5 more
8	9	10	11	12	13
- Deadline: Apps for dissection - Fall 2024 Advising Deadline - Fall 2024 Audit Petition Dead 5 more	7:30am CoursePrep 9am Integrated Curriculum I 9am ENGR 210 3 more	8am Research 1pm Office Hour 2pm ENGR 210 4pm ENGR 210	7:30am CoursePrep 9am ENGR 210 10am Research 4 more	7:30am CoursePrep 9am ENGR 112 10am ENGR 112 11am Research	
15	16	17	18	19	20
7am Research 2pm ENGR 430 4pm Office Hour	7:30am CoursePrep 9am GEAR Subcommittee M 9am ENGR 210 3 more	8am Research 1pm Office Hour 2pm ENGR 210 4pm ENGR 210	- DUBLINCA 7:30am CoursePrep 9am ENGR 210 4 more	7:30am CoursePrep 9am ENGR 112 10am ENGR 112 11am Research	
22	23	24	25	26	27
- Fall 2024 Census 7am Research 8am Deadline: Printed Core 2 more	7:30am CoursePrep 9am Integrated Curriculum I 9am ENGR 210 3 more	- Deadline: Grade Appeals for 8am Research 1pm Office Hour 2 more	7:30am CoursePrep 9am ENGR 210 10am Research 3 more	7:30am CoursePrep 9am ENGR 112 10am ENGR 112 11am Research	
29	30	Oct 1	2	3	4
7am Research 2pm ENGR 430 4pm Office Hour	7:30am CoursePrep 9am GEAR Subcommittee M 9am ENGR 210 3 more	8am Research 1pm Office Hour 2pm ENGR 210 4pm ENGR 210	7:30am CoursePrep 9am ENGR 210 10am Research 3 more	7:30am CoursePrep 9am ENGR 112 10am ENGR 112 11am Research	



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- Be sure you are able to **calculate your grade** based on the syllabus
- **Prioritize classes** that you anticipate **you may imagine will be difficult**
- **Prioritize assignments** with the **largest weight**
- **Attend class, ask questions, be respectful and show that you care about your academic success**
- **Communicate** with your instructor EARLY if something happens
- **Understand the expectations** of the instructor and learn how to adapt to different classes
- **Do NOT use the LAST Moment** to submit your work – **Start EARLY!**

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- Show up to class **ON TIME**, be attentive, and be engaged
- Try to have a **positive attitude** when learning even if you are having a difficult day/time with the topics
- Say **thank you** and show appreciation for those that are trying to help you
- Patience is key you will eventually figure it out so **do not give up**
- When communicating with a professor or visiting a professor's office be prepared, be positive and be courteous
- We care about you and want you to be successful, just show us that you care about your classes as well
- Don't hesitate to ask questions or to ask for help
- **Communicate, communicate, communicate**

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How To Approach Homework

- Doublecheck: **What is allowed in your class for exams?** Open notes? Closed? 1 page note / equation sheet?
- **Review your notes and class materials** before starting your homework assignment
- **Simulate an exam setting** when doing your homework assignment, no distractions, use the tools you can use on the exam, and complete as many problem as you can
- **Identify where your strengths/weakness are**, what concepts you are still not sure
- Then, **review your notes again** for your struggling part, and try to complete the rest of the problems
- If still not solved fully, then **try to discuss with your peers** to try and answer any remaining questions/confirm you are on the right path in answering questions
- **Go to Office Hours** for any final questions, this means it is essential that you start early

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How To Approach Exams

- Classes can have an **exam review session** before the exam this will be critically helpful, if you are feeling good after this session you are in good shape
- **Review all the class materials**, i.e., notes, homework, quizzes, and exam review (or practice exam) materials
- **Create your summary sheets** for important theory/concepts/equations for each topic
- Practice with many problems for problem-solving exams: For a problem, solve **at least 3 times** simulating the exam conditions
- The day before exam, Have a **GOOD and ENOUGH sleep**
- When the exam starts, **Breathe, Relax, and Trust yourself!** Just do your best on the exam

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After Exam

- **Reflect** on the exam experience **what did you do well** and **what can you improve**
- After you have reflected try to **move on and focus on the next exam**, there is nothing you can do about past.

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**Write your study plan for this semester
to have a successful academic term
(min. 3 sentences)**

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Topic 02. Professional Email Communication for Engineers

In the engineering profession, clear and professional email communication is a critical skill that serves as a foundation for effective collaboration and interaction. Whether corresponding with professors, colleagues, or industry professionals, the ability to craft precise and respectful emails reflects professionalism and competence.

This chapter introduces the following key areas:

1. **Understand the Principles of Professional Email Communication:** Learn why professionalism in emails is vital for building strong academic and professional relationships.
2. **Learn the Appropriate Structure of a Professional Email:** Master the components of an email, including crafting meaningful subject lines, structuring the email body, and using proper sign-offs.
3. **Apply Professional Language and Expressions:** Gain insights into using clear and appropriate language tailored to academic and engineering contexts.
4. **Practice Composing Clear and Effective Emails:** Develop practical skills in writing impactful emails through examples and exercises.

By the end of this chapter, you will be equipped with the tools to communicate effectively in academic and professional engineering settings, ensuring your emails leave a positive and lasting impression.

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Topic 02: Professional Email Communication For Engineers

Prof. J Lee

- Understand the principles of professional email communication for engineers.
- Learn the appropriate structure of a professional email, including subject lines, email body, and sign-off.
- Apply professional language and expressions suited to academic and engineering contexts.
- Practice composing clear and effective emails with relevant examples.

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- : includes various methods of speaking, writing, and responding both inside and outside the workplace.
- : occurs in-person or through **electronic** means.
- : encompasses meetings, presentations, memos, emails, marketing materials, and annual reports.
- : a **professional, formal, and respectful tone** is crucial for making a positive impression on colleagues, supervisors, and customers.
- : should be **accurate, complete, and easy to understand**.
- : should convey information **truthfully, directly, and clearly** to the audience.

Tips for Professional **Email** Communication:

- **Take Your Time:** Ensure your emails are **professional, accurate, and clear**. Invest the effort to **avoid errors and misunderstandings**.
- **Be Cordial and Review:** Maintain **a polite tone and reread your email** for potential misinterpretations **before hitting "send."**

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• Email Structure

Recipients

Subject **Subject Line** Request for Office Hours Appointment

Email Opening: Dear [Prefix last name], Dear Prof. Lee,

Email Body: My name is James Smith, and I am a student in your ENGR 112 this semester.
I am writing to inquire about scheduling a time during your office hours to discuss the recent assignment.
Could you please let m know your availability this week?

Email Ending: Thank you for your time and consideration.

Signoff: Best regards, / Sincerely,

Email Signature: James

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 Cal Poly
Humboldt.

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• Subject Line

Be Clear and Specific:

- Avoid generic titles.
- Directly state the purpose of the email in a concise manner.

Add Relevancy:

- Include details that the recipient will immediately recognize.
- Indicate what needs to be accomplished or considered after reading the email.

Example 1

 Send	To	
	Cc	
	Subject	Meeting Request For ENGR 112 Office Hours

Example 2

 Send	To	
	Cc	
	Subject	Prof I am having trouble w printing I just dropped off the assignment near your office

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• Email Opening

: address the Recipient Correctly - **use the name they prefer**

, which you can find on articles they've written or on their **LinkedIn profile**.

: If unsure of their preferred prefix (e.g., Dr., Prof.), use their full name to maintain respect and formality.

Examples

Good Greeting Examples:

Dear Prefix [Last Name]

Good morning Prefix [Last Name]

Dear Prof. Lee,

- I hope that you had a good weekend;
- I hope that you are having a nice day;
- I appreciate your quick response;
- Thank you for taking out time from your busy schedule;
- I am sorry to disturb your busy schedule;
- I know you are busy; or
- Thank you for your assistance, etc.

Not Suggested!

Hey; Howdy; How is it going [name]

Examples

Hey professor, or Hey guys,

I'm outside the office right now - where are you?

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- **Email Body**

- **Be Concise:** Include only the necessary details to convey your message clearly.
- **Be Specific:** Clearly state what you are requesting or need.
- **Show Respect and Appreciation:** Use language that acknowledges the recipient's valuable time.
- **Emphasize Key Points:** Use bold for important details, but **avoid overusing bold or ALL CAPS**.

Tips:

- **Use Subheaders and Lists:** When discussing multiple subtopics or tasks, use subheaders or **bullet points** to organize information clearly. This helps the reader easily follow your message and understand what needs to be done.

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- **Email Ending and SignOff**

- end it with a respectful and brief salutation;
- invite your recipient to reach out for more questions, or wish them success.
- If it was a long email, it could also gently reiterate your main request, question, or motivation.

Examples

If you have any questions, please let me know.

Thank you.

Sincerely,

Students A

I hope you have a wonderful weekend.

Best regards,

Students A

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Exercise 1: Email to Professor

Topic 02 – 8

Identify why the email is not professional and appropriate. Correct the email.

Hey Miss Lee,

I know the HW4 due date is already passed but I wanted to ask for an extension. We had a busy week recruiting for my fraternity and also I had a mandatory club meeting last night as well so when I started your assignment this morning an hour before it was due I didn't have time and didn't want to work on this because it is so confusing. I heard that John got an xtension. I need one too so I will turn it in when things are less busy at the fratneristy. Also it seems like everyone in the class is struggling with HW04 so you might as well push back the due date for everyone.

Later,
Students A

Dear Prof. Lee,

I am Student A in your ENGR 112 class this semester. I wanted to thank you again for your help in office hours earlier this week.

I am sorry for my late request as the due date of HW 04 is in a couple of days, but I wanted to ask whether it is possible to ask for an extension on HW 04.

I know in our syllabus that you accept one late assignment, but there have been several extenuating circumstances for me in the past several days. I would be happy to discuss them with you if you would like.

If this request is not acceptable, it would be appreciated if the one late assignment policy can be applied for my HW 04.

Thank you for your help and understanding.

Best regards,
Student A

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Exercise 2: Email to Professor

Topic 02 – 9

Identify why the email is not professional and appropriate.

Hey Professor,

So the exam is coming up and as you may know, I ve not done any of the assignments.

I really need to pass this courses in order to graduate and I need at least a C- in the class. I am coming by this afternoon to your office once I have finished hanging out with my friends. I need some last minute tutoring and exam review so that I can pass. It may take some time so you may need to help me until 9PM tonight in order for me to pass.

See you soon,
James

??

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Compose **a professional email** requesting an individual office hours appointment with me.

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Topic 03. Strategic Goal Setting for Success in Engineering

Understanding your academic and professional goals is a cornerstone of engineering success. This chapter emphasizes the importance of identifying and setting clear objectives to navigate your journey through the School of Engineering effectively. From gaining an overview of engineering disciplines to setting personal and professional goals, this topic lays the foundation for a purposeful and strategic approach to your academic career.

This chapter covers the following key areas:

1. **Gain an Overview of Engineering Programs:** Learn about the expectations, core areas, and distinct aspects of Environmental, Energy Systems, and Mechanical Engineering programs.
2. **Explore Engineering Degrees:** Understand the different degree options and how they align with your aspirations and interests.
3. **Understand General Requirements in Engineering:** Review the essential academic and technical skills required for success in engineering studies.
4. **Set Personal and Professional Goals:** Develop a clear framework for your short-term and long-term objectives, ensuring alignment with your academic and career aspirations.

By the end of this chapter, you will have a structured plan to approach your engineering education strategically, enabling you to make informed decisions and achieve academic and professional success.

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Topic 03: Strategic Goal Setting for Success in Engineering

Prof. J Lee

- **Gain an Overview of Engineering Programs.**

- : Understand the core areas and expectations for the Engineering disciplines

- Environmental Engineering
 - Energy Systems Engineering
 - Mechanical Engineering

- **Explore Engineering Degrees.**

- **Understand General Requirements in Engineering.**

- **Set Personal and Professional Goals.**

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What is your dream career?

What are your plans to achieve it?

- Goal(s) for this semester
- Goal(s) for your time in your Engineering major
- Goal(s) after graduation

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Environmental Engineering

- Focuses on developing solutions to **environmental challenges, including water and air quality, waste management, and pollution control.**
- Involves the **design of systems for sustainable resource management and environmental protection.**
- Combines principles of **engineering, biology, chemistry, and ecology.**

Core Expectations for Environmental Engineers

- Involves **understanding environmental systems, sustainable design, and ecological impacts.**
- Focuses on:
 - Designing systems **for pollution control and resource management**
 - Managing **water treatment, air quality, and waste disposal**
 - Developing **sustainable infrastructure and environmental remediation solutions**

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Energy Systems Engineering

- Specializes in **designing, developing, and optimizing energy systems**, including renewable energy sources like wind, solar, and bioenergy.
- Focuses on **energy production, distribution, and efficiency**, with an emphasis on sustainability.
- Involves **multidisciplinary collaboration** across mechanical, electrical, and environmental engineering to address **global energy needs**.

Core Expectations for Energy Systems Engineer

- Requires **expertise in energy production, distribution, and sustainability**.
- Involves:
 - Designing and optimizing renewable energy systems (e.g., solar, wind, bioenergy)
 - Improving energy efficiency in systems and processes
 - Collaborating on multidisciplinary projects that address global energy challenges

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Mechanical Engineering

- A branch of engineering that applies engineering physics, mathematics, and materials science **to design, analyze, manufacture, and maintain mechanical systems.**
- Involves **the design, production, and operation of machinery.**
- One of **the oldest and broadest** engineering disciplines.
- Overlaps with fields such as **aerospace, metallurgical, civil, structural, electrical, manufacturing, chemical, industrial, energy systems, robotics, and biomedical** engineering.

Core Expectations for Mechanical Engineers

- Requires proficiency in core areas such as **mechanics, structural analysis, and tools like graphics, computer programming, and product lifecycle management.**
- Focuses on **designing and analyzing:**
 - manufacturing plants, industrial equipment, and machinery
 - heating and cooling systems
 - aircraft and watercraft
 - robotics
 - medical devices
 - weapons and other mechanical systems, etc.

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Undergraduate Programs for a Bachelor's Degree (4-5 years):

- Bachelor of Science (B.Sc. or B.S.)
- Bachelor of Engineering (B.Eng. or B.E.)
- Bachelor of Science in Engineering (B.Sc. Eng.)

• ABET Accreditation:

: In the United States, most undergraduate Engineering programs are accredited by the Accreditation Board for Engineering and Technology (ABET). This accreditation ensures that universities meet consistent course requirements and maintain high standards across engineering programs.

Graduate Programs

(1) Master Program

- Master of Science in Engineering Science (MSES)
- Master of Science in Engineering (MSE, M.Sc.Eng, or MSc Eng)
- Master of Engineering (MEng)



(2) Doctoral Program

- Doctor of Philosophy (Ph.D.)

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- Engage in **research or community-based projects** to develop **practical problem-solving skills** and gain **real-world experience**.

- **Creativity and Innovation**

: The demands of future work skills research emphasize the need for study components that foster creativity and innovation in students.

- **Internships** and Cooperative Education:

: Complete internships or cooperative education experiences during your studies to gain industry-relevant skills and professional experience.

- Focuses on **original research** in engineering.

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Class Assignment

Topic 03 – 8

- **Write a brief reflection on your dream career.**
- **Outline your goals, including at least one sentence for each of the following:**
 - Your goal for this semester
 - Your goal for your time in your major
 - Your goal after graduation

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Topic 04. Engineering Curriculum Pathways and Elective Opportunities

Topic 04 provides an essential understanding of how to navigate the academic requirements and opportunities within your engineering program. It emphasizes the importance of planning and strategic decision-making to ensure academic and career success. This topic covers:

1. **Understand the Required Core Engineering Courses**

Review the foundational courses essential for each engineering discipline to build a strong academic base.

2. **Explore Elective Requirements and Options**

Investigate the elective courses available in your program and their role in enhancing your academic and professional journey.

3. **Plan Your Elective Path**

Develop a tailored plan for selecting electives that align with your major's requirements, academic goals, and career aspirations.

Understanding the curriculum pathways enables students to take full advantage of the resources and opportunities provided by their program. This preparation ensures they can meet both academic requirements and long-term career objectives effectively.

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Topic 04: Engineering Curriculum Pathways & Elective Opportunities

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- Understand the Required Core Engineering Courses.
- Explore Elective Requirements and Options.
- Plan Your Elective Path.
 - : Develop a plan for selecting electives that align with your major's requirements, academic plan, and career goals.

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- **Fundamentals in Engineering**

- ENGR 115 [3] Intro to Eng
- ENGR 123 [1] Eng Fabrication: *Only Required for ME*
- ENGR 205 [3] Intro to Design

- **Foundational Engineering Mechanics**

- ENGR 210 [3] Statics
- PHYX 109 [4] Dynamics
- ENGR 330 [3] Mechanics and Sci of Materials
- ENGR 331 [3] Thermodynamics I
- ENGR 333 [3] Fluid Mechanics

- **Graphics/Programming**

- ENGR 225 [3] Comp Methods for Eng I
- ENGR 226 [3] Comp Methods for Eng II
- ENGR 326 [3] Comp Methods for Eng III
- ENGR 313 [3] Systems Analysis
- ENGR 322 [4] Risk and Data Analysis for Eng
- ENGR 115/210/225 LAB SolidProfessor

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Major Elective Program (12 Units)

With advice and approval of a Mechanical Engineering faculty advisor or the department chair, **select 1 life science elective course** and **3 senior engineering design courses** from the following lists to form a coherent elective program.

https://catalog.humboldt.edu/preview_program.php?catoid=10&poid=6304

Life Science Elective

Complete one course.

- [BIOL 104 – General Biology](#) Units: 3
- [BIOL 105 – Principles of Biology](#) Units: 4
- [SOIL 104 – Introduction to Sustainable Agriculture](#) Units: 3

Engineering Design

Engineering Design List A

- [ENGR 421 – Advanced Numerical Methods for Engineers I](#) Units: 3
- [ENGR 433 – Advanced Manufacturing Processes](#) Units: 3
- [ENGR 462 – Mechatronics](#) Units: 3
- [ENGR 468 – Materials Processes](#) Units: 3
- [ENGR 471 – Thermodynamics and Energy Systems II](#) Units: 3

Engineering Design List B

- [ENGR 418 – Applied Hydraulics](#) Units: 3
- [ENGR 434 – Air Quality Management](#) Units: 3
- [ENGR 473 – Building Energy Analysis](#) Units: 3
- [ENGR 475 – Renewable Energy Power Systems](#) Units: 3
- [ENGR 478 – Electricity Grids and Distributed Renewable Energy](#) Units: 3
- [ENGR 481 – Selected Topics with Engineering Design](#) Units: 3
- [ENGR 498 – Directed Design Project](#) Units: 1–3 (Required Units: 3)

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Major Elective Program (12 Units)

With advice and approval of an Environmental Resources Engineering faculty advisor and the department chair, select **one upper division science or natural resources course** and **3 senior engineering design courses** from the following lists to form a coherent elective program.

https://catalog.humboldt.edu/preview_program.php?catoid=12&poid=7357

Science/Natural Resources Electives

Complete one course:

- BIOL 330 - Principles of Ecology Units: 4
- CHEM 341 - Quantitative Analysis Units: 5
- CHEM 370 - Earth System Chemistry Units: 3
- FISH 320 - Limnology Units: 3
- GEOL 303 - Earth Resources and Global Environmental Change Units: 3
- GEOL 306 - General Geomorphology Units: 3
- NAS 309 - Traditional Ecological Knowledge and Indigenous Natural Resource Management Units: 3
- OCN 320 - Physical Oceanography Units: 4
- PHYX 315 - Introduction to Electronics and Electronic Instrumentation Units: 3
- SOIL 360 - Origin and Classification of Soils Units: 3
- SOIL 363 - Wetland Soils Units: 3

Engineering Design Electives

Complete three courses.

- ENGR 418 - Applied Hydraulics Units: 3
- ENGR 421 - Advanced Numerical Methods for Engineers I Units: 3
- ENGR 434 - Air Quality Management Units: 3
- ENGR 436 - Solid Waste Engineering Units: 3
- ENGR 441 - Hydrology II Units: 3
- ENGR 443 - Groundwater Hydrology Units: 3
- ENGR 445 - Water Resources Planning and Management Units: 3
- ENGR 448 - River Hydraulics Units: 3
- ENGR 452 - Drinking Water Treatment Engineering Units: 3
- ENGR 453 - Wastewater Treatment Engineering Units: 3
- ENGR 455 - Engineered Natural Treatment Systems II Units: 3
- ENGR 471 - Thermodynamics and Energy Systems II Units: 3
- ENGR 473 - Building Energy Analysis Units: 3
- ENGR 475 - Renewable Energy Power Systems Units: 3
- ENGR 478 - Electricity Grids and Distributed Renewable Energy Units: 3
- ENGR 481 - Selected Topics with Engineering Design Units: 3
- ENGR 498 - Directed Design Project Units: 1-3 (Required Units: 3)

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Major Elective Program (15 Units)

With advice and approval of a faculty advisor or the department chair, **select 3 engineering design elective courses, one energy and environmental justice elective course and one geoscience and climate science elective course** from the following lists to form a coherent elective program.

https://catalog.humboldt.edu/preview_program.php?catoid=12&poid=7639&returnto=2007

Energy Systems Engineering Design Elective Courses (9 Units)

Complete three courses.

- ENGR 471 – Thermodynamics and Energy Systems II Units: 3
- ENGR 473 – Building Energy Analysis Units: 3
- ENGR 475 – Renewable Energy Power Systems Units: 3
- ENGR 478 – Electricity Grids and Distributed Renewable Energy Units: 3

Energy and Environmental Justice Elective Courses (3-4 Units)

Complete one course.

- ESM 305 – Environmental Conflict Resolution Units: 3
- ESM 325 – Environmental Law and Regulation Units: 3
- ENST 295 – Power, Privilege and the Environment Units: 4
- ENST 480 – Special Topics Units: 3 (special topic "Energy Justice" only)
- ENGR 305 – Appropriate Technology Units: 3
- NAS 309 – Traditional Ecological Knowledge and Indigenous Natural Resource Management Units: 3
- NAS 332 – Environmental Justice Units: 3
- NAS 364 – Federal Indian Law I Units: 4

Geoscience and Climate Science Elective (3 Units)

Complete one course.

- CHEM 370 – Earth System Chemistry Units: 3
- GEOL 303 – Earth Resources and Global Environmental Change Units: 3
- OCN 420 – Oceans and Climate Units: 3

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- Review **your major's roadmap** and plan **potential elective courses** based on the major's requirements, **aligning with your academic plan and career goals**.

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Topic 05. Preparing a Professional Curriculum Vitae (CV)

Topic 05 equips students with the foundational knowledge and tools to craft a professional Curriculum Vitae (CV) tailored for the engineering field. A professional CV is not just a document but a key representation of your academic achievements, skills, and experiences, reflecting your readiness for internships, research positions, and future career opportunities. This topic covers:

1. **Introduction to the Structure and Purpose of a CV:** Understand the essential sections of a CV, including Education, Skills, Experience, and Projects, and how each contributes to presenting your qualifications effectively.
2. **Best Practices for Professional CVs in Engineering:** Learn formatting techniques, industry-specific tips, and strategies to highlight relevant experiences that align with engineering opportunities.
3. **Developing and Refining Your CV:** Start building your CV or enhancing an existing one by integrating feedback and aligning it with your academic and career goals.

Creating a well-crafted CV early in your academic journey positions you to seize opportunities, stand out in competitive fields, and align with the professional standards expected in engineering careers."

This structured introduction will guide the chapter, emphasizing the importance of proactive CV preparation for career success.

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Topic 05: Preparing a Professional Curriculum Vitae (CV)

Prof. J Lee

- Understand the Required Core Engineering Courses.
- Explore Elective Requirements and Options.
- Plan Your Elective Path.
 - : Develop a plan for selecting electives that align with your major's requirements, academic plan, and career goals.

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- **What is a CV and Why it is important.**

- A CV (Curriculum Vitae) is your personal marketing tool. It **highlights your academic achievements, skills, and professional experiences.**
- It serves as a first impression to employers, research programs, or graduate schools.

- **Role of a CV for Engineering Students:**

- **Internships & Co-op Programs:** Companies often require CVs to assess candidates for internships or cooperative education positions.
- **Undergraduate Research Opportunities:** Professors and research programs expect a professional CV to evaluate student fit for their projects.
- **Scholarships & Competitions:** CVs may be required for applications to scholarships, fellowships, or student engineering competitions.

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- **Role of a CV for Engineering Students (continued):**

- **Tool for Self-Reflection & Goal Setting:**

- Helps you reflect on your achievements and progress.
- Encourages you to set goals for new experiences to strengthen your CV over time.

- **Staying Competitive in the Job Market:**

- The engineering job market is competitive, and having a professional CV sets you apart.
- CVs help communicate your unique skills and experiences to potential employers or academic advisors.

- **Preparing for Future Growth:**

- Learning how to build a CV early helps you prepare for future roles such as graduate school applications, job placements, or research assistantships.
- As you gain more experience, your CV becomes a living document, evolving with your professional journey.

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- **Contact Information (Header):** Name, phone, email, LinkedIn (if applicable).
- **Education:** Degree(s), major, university, graduation date (or expected date).
- **Experience:** Internships, research, or projects (include role and key responsibilities).
- **Skills and Certifications:** Technical skills, software tools, certifications.
- **Awards, Honors, and Scholarships:** Scholarships, awards, competitions.
- **Extracurricular Activities and Leadership Roles:** Clubs, organizations, volunteer work, leadership positions held.
- **Publications, Presentations, and Projects (Optional):** Academic papers, conference presentations, or capstone projects.

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Contact Information (Header)

- What to Include:
 - Full Name
 - Phone Number
 - Professional Email Address
 - LinkedIn Profile (if relevant)
 - Optional: Website or Portfolio Link (for projects/technical skills)
- Tips:
 - Use a professional email (e.g., firstname.lastname@email.com).
 - Ensure your LinkedIn profile is up-to-date if you include it.

Education

- What to Include:
 - Degree(s) (e.g., Bachelor of Science in Mechanical Engineering)
 - University Name
 - Graduation Date or Expected Graduation Date
- Tips:
 - List education in reverse chronological order (most recent first).
 - Highlight academic achievements (e.g., GPA, honors) if applicable.

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Experience

- What to Include:
 - **Internships, Research Projects, or Relevant Work Experience**
 - Your Role or Position Title
 - Company/Institution Name and Dates of Engagement
 - Bullet Points Describing Your Responsibilities and Achievements
- Tips:
 - **Use action verbs** (e.g., "Designed," "Developed," "Analyzed").
 - Focus on quantifiable achievements (e.g., "Reduced production costs by 10%").
 - Tailor this section to align with the role you're applying for.

Extracurricular Activities and Leadership Roles (Optional)

- What to Include:
 - Engineering Clubs, Student Organizations, or Volunteer Work
 - Leadership Positions Held (e.g., Team Lead, Club President)
- Tips:
 - Emphasize teamwork, leadership, and communication skills.
 - Include activities that show your passion for engineering.

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Skills and Certifications

- What to Include:
 - **Technical Skills** (e.g., SolidWorks, MATLAB, AutoCAD)
 - **Programming Skills** (e.g., Python, C++)
- Tips:
 - Group related skills to enhance readability (e.g., "CAD Tools: SolidWorks, AutoCAD").
 - Include skills relevant to the role or industry.

Awards, Honors, and Scholarships

- What to Include:
 - **Academic or Professional Awards**
 - Engineering Competitions (e.g., Robotics Challenges)
 - **Scholarships and Fellowships**
- Tips:
 - Highlight achievements that demonstrate leadership or innovation.
 - Mention awards that align with your academic or career goals.

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Publications, Presentations, and Projects

- What to Include:
 - **Academic Papers, Conference Presentations, or Capstone Projects**
 - Include Titles, Venues, and Dates
- Tips:
 - Showcase complex projects that align with the field or role you are pursuing.
 - Focus on projects where you had significant involvement or leadership.

Professional Affiliations (Optional)

- What to Include:
 - Memberships in Engineering Societies (e.g., ASME, IEEE, SWE)
 - Roles or contributions within these organizations
- Tips:
 - Highlight affiliations that demonstrate professional involvement in the field.

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Tips for Constructing a Professional and Competitive CV Topic 05 – 9

- **Use a Clean Layout:**
 - Stick to simple, professional fonts like Times New Roman, Garamond, Arial or Calibri, etc.
 - Ensure **consistent formatting** for headings, bullet points, and spacing.
- **Tailor Your CV:**
 - Customize your CV for specific roles or industries.
 - **Highlight relevant experience and skills** based on the job description.
- **Use Action-Oriented Language:**
 - Start bullet points with strong action verbs.
 - Focus on achievements and impact (e.g., "Improved efficiency by 15%").
- **Keep it Concise:**
 - Include **only the most relevant and impactful information.**
- **Proofread Thoroughly:**
 - Check for spelling and grammar errors.
 - Ask a professor or mentor to review your CV for feedback.
- **Update Regularly:**
 - Add new experiences, skills, and achievements as they occur.
 - Keep your CV current and ready for new opportunities.

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Example
created by
Prof. Lee:

Topic 05 – 10

John A. Doe

123 Engineering Lane, Arcata, CA 95521 | (123) 456-7890
johndoe@email.com | LinkedIn: linkedin.com/in/johndoe

Education

B.S. Mechanical Engineering Expected Graduation in May 2029
Cal Poly Humboldt, Arcata, CA
Relevant Coursework: First-Year Seminar Engineering, Calculus I, Physics I

Experience

- Undergraduate Research Assistant** August 2024 – Present
Cal Poly Humboldt, Arcata, CA
 - Conducted research on mechanical and thermal analysis in bone drilling under the supervision of faculty.
 - Collaborated with orthopaedic surgeons on experiments.
 - Utilized a dynamometer to measure forces during bone drilling experiments conducted on a CNC milling machine.
- Volunteer Engineering Assistant** October 2024
Community STEM Workshop, Eureka, CA
 - Assisted high school students in building robots for a local competition
 - Provided guidance on using tools and engineering design principles

Extracurricular Activities

- Member, American Society of Mechanical Engineers (ASME)** September 2024 – Present
Cal Poly Humboldt Chapter
- Participant, Robotics Club** September 2024 – Present
Cal Poly Humboldt
 - Working with a team to design and build a robot for an upcoming regional competition

Skills

- Technical Skills: SolidWorks, MATLAB, Microsoft Office (Excel, Word, PowerPoint)
- Programming Languages: Python (beginner), C++ (beginner)

Awards & Honors

- Dean's List, Cal Poly Humboldt Fall 2024
- Recipient, First-Year Engineering Scholarship Fall 2024

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- Begin **creating your professional CV** tailored **for the engineering job market**.
- If you already have a CV, revise and enhance it using the insights from today's session.

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Class Assignment

Topic 05 – 12

- **Submit 3 items you plan to add or revise on your CV,
based on today's learning.**

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Topic 06. Engineering Homework- Purpose, Process, and Practice

Topic 06 introduces the essential aspects of engineering homework and its role in developing fundamental engineering skills. This chapter is designed to help students understand why homework is structured the way it is and how to approach it effectively. It emphasizes:

1. **The Purpose of Engineering Homework:** Learn how assignments build problem-solving, critical thinking, and practical application skills necessary for success in the engineering field.
2. **Effective Homework Completion Strategies:** Discover suggested methods to independently study, solve, and collaborate while upholding academic integrity.
3. **Mastering the Standard Homework Format:** Familiarize yourself with the typical format of engineering homework, including Given, Find, Solution, and Answer sections, ensuring clear and professional presentation of solutions.
4. **Hands-On Practice:** Apply the learned strategies and format through structured practice problems, reinforcing comprehension and skills.

A trigonometry animation is provided to aid in understanding critical mathematical concepts often used in engineering homework. This preparation ensures students can confidently tackle assignments while building skills essential for academic and career success.

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Topic 06: Engineering Homework : Purpose, Process, and Practice

Prof. J Lee

- **Understand the Purpose of Engineering Homework.**

: Learn why assignments are structured to develop problem-solving, critical thinking, and application skills essential for engineering.

- **Learn Effective Approaches for Homework Completion.**

: Review suggested procedures to independently study, solve, and collaborate while maintaining academic integrity.

- **Master the Standard Homework Format.**

: Familiarize with the typical structure of engineering solutions—identifying Given, Find, Solution, and Answer sections.

- **Apply Knowledge Through Practice.**

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• Why assigned

- **Gauge students' understanding** of lecture topics.
- **Deepen students' knowledge** of the subject matter.
- **Strengthen problem-solving skills** by exploring multiple approaches.
- **Encourage students to stay up-to-date** with course material.
- **Enhance time management skills** through structured problem-solving

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- **Suggested Procedures**

1. **Study the material thoroughly**, including lecture notes and textbooks.
2. Attempt to **solve the problems independently**, without consulting your notes or textbooks.
3. After completing as much as possible, use your lecture materials and textbooks to tackle any remaining questions.
4. **Discuss** challenging problems **with classmates**,
but remember: you **must write up solutions independently!**
5. For unresolved questions, **attend office hours** to clarify any remaining concepts

- **Never Suggested / Not Allowed:** Violating these guidelines may lead to “Plagiarism”!
 - Do not copy someone else’s work.
 - Avoid using online resources where someone else completes the work for you or provides direct solutions.
 - Do not share your assignments with others, either through Google Docs, hard copies, or any other form.

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• Typical Format for Engineering Problem Solving**GIVEN :**

- Restate significant information from the problem statement (e.g., assumptions, physical properties, etc)
- Do not repeat the entire problem statement verbatim.
- Include any given diagrams if needed to clarify problem statement.

FIND :

- State unknowns that are to be determined.
- Assign each unknown a **symbolic** representation (e.g., Find: the value of force, F)

SOLUTION :

- When applicable, draw an appropriate sketch showing the major features of the problem (e.g., a Free Body Diagram).
- Use symbols that are convenient and well-accepted.
- Reference any tables and figures used to determine necessary properties.
- Write governing equations.
- Work problems in the unit system given (i.e., SI or US Customary).
- Using basic units is recommended (e.g., 20 MPa is $20.0 \times 10^6 \text{ N/m}^2$).
- Simplify each equation algebraically, and solve for unknown quantities.
- Underline major intermediate answers.
- Acceptably present final answers using correct prefixes and significant figures (e.g., 85,000 N is 85.0 kN).

Tips: Show ALL the processes !

ANSWER :

- Present final answers in the following format: symbol, value, units (e.g., $F = 5.00 \text{ N}$).
- Think and reflect on the values.
- **Enclose final answers in boxes.**

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- **What do you think?**

ENGR 210 Statics, Fall 2024
Homework 03
Due: 09:00 pm 09/27/2024
Prof. J Lee

I. Forces in 3D: Analyze using Position Vectors

- (1) Express each of forces as a Cartesian vector.
- (2) Determine the magnitude of the resultant force.
- (3) Determine its coordinate direction angles.

1) $F_{AB} = (240 \cos(40^\circ))\hat{i} + (240 \sin(40^\circ))\hat{j} + (150 \frac{z}{r})\hat{k}$
 $r_{AB} = (\cos(40^\circ)\hat{i} - \sin(40^\circ)\hat{j} + (\sin(40^\circ)\frac{z}{r}))\hat{k}$

2) $|F| = \sqrt{(240 \cos(40^\circ))^2 + (240 \sin(40^\circ))^2 + (150)^2} = 584$
 $\alpha = \cos^{-1}(\frac{240 \cos(40^\circ)}{584}) = 64.94^\circ$
 $\beta = \cos^{-1}(\frac{-240 \sin(40^\circ)}{584}) = 64.94^\circ$
 $\gamma = \cos^{-1}(\frac{150}{584}) = 74.6^\circ$

II. Moment

- Determine the resultant moment about point O.

$(M_O)_x = (M_A)_x + (M_B)_x = -(1)(400 \sin(40^\circ))(2) + (805.24)$
 $(M_O)_y = 2.5(1200) + 0 = 300$
 $(M_O)_z = 0 + 2.5(500) = 1250$
 $M_R = \sqrt{(-805.24)^2 + 300^2 + 1250^2} = 1194.76 \text{ N}\cdot\text{m}$

III. Couple Moment

- If $F_2 = 150 \text{ lb}$, determine the resultant couple moment.

$M_R = d F_1 \times F_2 - d F_2 \times F_1$
 $(1.5 \times 300) - (4 \times 120)$
 $= -60 \text{ lbf}\cdot\text{ft}$

Handwritten notes include:
 $d_{12} = 1.5$
 $d_{21} = 4$
 $F_1 = 150 \angle 40^\circ$
 $F_2 = 150 \angle 40^\circ$
 $F_1 = 150 \angle 40^\circ$
 $F_2 = 150 \angle 40^\circ$

Handwritten notes and calculations for ENGR 210 Statics, Fall 2024, Homework 03.

ENGR 210 Statics, Fall 2024
Homework 03
Due: 09:00 pm 09/27/2024

Prof. J Lee

I. Forces in 3D: Analyze using Position Vectors

1. (1) Express each of forces as a Cartesian vector.
(2) Determine the magnitude of the resultant force.
(3) Determine its coordinate direction angles.

Handwritten calculations for Problem 1:

Force A: $A = 40 \text{ N}$
 $\vec{A} = 40 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{80}{\sqrt{14}} \vec{j} + \frac{120}{\sqrt{14}} \vec{k}$
 $\vec{A} = 10.66 \vec{i} + 21.33 \vec{j} + 32 \vec{k} \text{ N}$

Force B: $B = 250 \text{ N}$
 $\vec{B} = 250 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{500}{\sqrt{14}} \vec{j} + \frac{750}{\sqrt{14}} \vec{k}$
 $\vec{B} = 66.67 \vec{i} + 133.33 \vec{j} + 200 \vec{k} \text{ N}$

Force C: $C = 40 \text{ N}$
 $\vec{C} = 40 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{80}{\sqrt{14}} \vec{j} + \frac{120}{\sqrt{14}} \vec{k}$
 $\vec{C} = 10.66 \vec{i} + 21.33 \vec{j} + 32 \vec{k} \text{ N}$

Resultant Force R: $\vec{R} = \vec{A} + \vec{B} + \vec{C}$
 $\vec{R} = (10.66 + 66.67 + 10.66) \vec{i} + (21.33 + 133.33 + 21.33) \vec{j} + (32 + 200 + 32) \vec{k}$
 $\vec{R} = 87.99 \vec{i} + 175.66 \vec{j} + 264 \vec{k} \text{ N}$

Magnitude of R: $R = \sqrt{87.99^2 + 175.66^2 + 264^2} = 319.15 \text{ N}$

Coordinate direction angles: $\alpha = \cos^{-1} \left(\frac{87.99}{319.15} \right) = 74.4^\circ$, $\beta = \cos^{-1} \left(\frac{175.66}{319.15} \right) = 58.4^\circ$, $\gamma = \cos^{-1} \left(\frac{264}{319.15} \right) = 35.3^\circ$

II. Moment

1. Determine the resultant moment about point O.

Handwritten calculations for Problem 2:

Force A: $A = 150 \text{ N}$
 $\vec{A} = 150 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{300}{\sqrt{14}} \vec{j} + \frac{450}{\sqrt{14}} \vec{k}$
 $\vec{A} = 40.82 \vec{i} + 81.64 \vec{j} + 122.46 \vec{k} \text{ N}$

Force B: $B = 200 \text{ N}$
 $\vec{B} = 200 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{400}{\sqrt{14}} \vec{j} + \frac{600}{\sqrt{14}} \vec{k}$
 $\vec{B} = 54.43 \vec{i} + 108.86 \vec{j} + 163.28 \vec{k} \text{ N}$

Force C: $C = 300 \text{ N}$
 $\vec{C} = 300 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{600}{\sqrt{14}} \vec{j} + \frac{900}{\sqrt{14}} \vec{k}$
 $\vec{C} = 81.64 \vec{i} + 163.28 \vec{j} + 244.92 \vec{k} \text{ N}$

Resultant Moment M: $\vec{M} = \vec{r}_A \times \vec{A} + \vec{r}_B \times \vec{B} + \vec{r}_C \times \vec{C}$
 $\vec{M} = (125.3 \vec{i} - 65 \vec{j} + 125 \vec{k}) \text{ N}\cdot\text{m}$

III. Couple Moment

1. If $F_1 = 150 \text{ lb}$, determine the resultant couple moment.

Handwritten calculations for Problem 3:

Force F1: $F_1 = 150 \text{ lb}$
 $\vec{F}_1 = 150 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{300}{\sqrt{14}} \vec{j} + \frac{450}{\sqrt{14}} \vec{k}$
 $\vec{F}_1 = 40.82 \vec{i} + 81.64 \vec{j} + 122.46 \vec{k} \text{ lb}$

Force F2: $F_2 = 200 \text{ lb}$
 $\vec{F}_2 = 200 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{400}{\sqrt{14}} \vec{j} + \frac{600}{\sqrt{14}} \vec{k}$
 $\vec{F}_2 = 54.43 \vec{i} + 108.86 \vec{j} + 163.28 \vec{k} \text{ lb}$

Force F3: $F_3 = 300 \text{ lb}$
 $\vec{F}_3 = 300 \left(\frac{1}{\sqrt{1^2 + 2^2 + 3^2}} \right) \vec{i} + \frac{600}{\sqrt{14}} \vec{j} + \frac{900}{\sqrt{14}} \vec{k}$
 $\vec{F}_3 = 81.64 \vec{i} + 163.28 \vec{j} + 244.92 \vec{k} \text{ lb}$

Resultant Couple Moment M: $\vec{M} = \vec{r}_1 \times \vec{F}_1 + \vec{r}_2 \times \vec{F}_2 + \vec{r}_3 \times \vec{F}_3$
 $\vec{M} = 540 \text{ lb}\cdot\text{ft}$

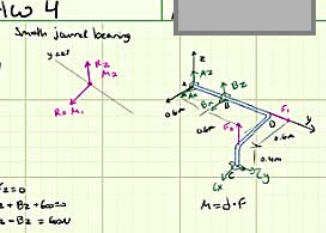
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• What do you think?

ENGR 210 HW 4 2/3

II 1) Given: $F_1 = 400\text{ N}$, $F_2 = 600\text{ N}$
Find: $A_x, A_z, B_x, B_z, C_x, C_y$

Solution:



$\sum F_x = 0$
 $A_x - B_x + C_x = 0$

$\sum F_y = 0$
 $C_y + 400 = 0$
 $C_y = -400\text{ N}$

$\sum F_z = 0$
 $A_z + B_z + 600 = 0$
 $A_z + B_z = -600$

$\sum M_x = 0$
 $[F_1(0.4\text{ m}) + (600\text{ N})(0.6\text{ m})] \text{ Nm}$
 $[F_2(0.4\text{ m})(0.4\text{ m}) + 360\text{ Nm}]$
 $C_x = \frac{-360\text{ Nm}}{0.4\text{ m}}$
 $C_x = -900\text{ N}$

$\sum M_y = 0$
 $[M_{C_y} + A_z(0.6\text{ m}) + (1.2\text{ m})(600\text{ N})] \text{ Nm}$
 $-(0.4\text{ m})(C_y) - (0.6\text{ m})(B_z) + 720\text{ Nm} = 0$
 $B_z = \frac{720\text{ Nm} + (0.4\text{ m})(-400\text{ N})}{0.6\text{ m}}$
 $B_z = \frac{-560\text{ Nm}}{0.6\text{ m}} = -933.3\text{ N} = 933\text{ N} = B_z$

$\sum M_z = 0$
 $M_{B_z} + M_{C_z} + M_{F_1}$
 $= B_z(0.6\text{ m}) - C_x(1.2\text{ m}) + C_y(0.6\text{ m})$
 $B_z = \frac{-(900\text{ N})(1.2\text{ m}) + (-400\text{ N})(0.6\text{ m})}{0.6\text{ m}}$
 $B_z = \frac{-840\text{ Nm}}{0.6\text{ m}} = -1400\text{ N}$

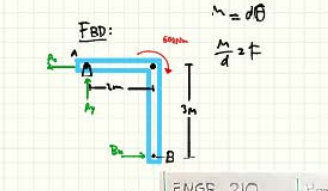
Answer: $A_x = -500\text{ N}$, $A_z = 333\text{ N}$, $B_x = 1400\text{ N}$, $B_z = -933\text{ N}$, $C_x = -900\text{ N}$, $C_y = -400\text{ N}$

ENGR 210 HW 4 1/4

I. (1) Given: Active Moment; A: Pin, B: Roller; Distance Info

Find: M_R, A_x, A_y, B_x

Solution:



$\sum M_A = 0$
 $B_x(3\text{ m}) - 600\text{ Nm} = 0 \Rightarrow B_x = \frac{600\text{ Nm}}{3\text{ m}}$
 $B_x = 200\text{ N}$

$\sum F_x = 0 \Rightarrow -A_x + \frac{600}{3} + B_x = 0$
 $\Rightarrow A_x = 500\text{ N}$

$\sum F_y = 0 \Rightarrow A_y - \frac{600}{2} = 0 \Rightarrow A_y = 300\text{ N}$

Answer: $A_x = -500\text{ N}$, $A_y = 300\text{ N}$

ENGR 210 Homework 04 1/3

1. Given: $A = 600\text{ N/m}$
Pin support @ point A
Roller @ point B

Find: A_x, A_y, B_x

Workings: 3
Equations: 3

Solution:

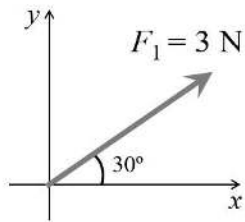
$\sum F_x = 0: A_x + B_x = 0$
 $\sum F_y = 0: A_y = 0$
 $\sum M_A = 0: 3B_x + 600 = 0$
 $3B_x = -600$
 $B_x = -200\text{ N}$

$\sum F_x = 0: A_x + 200 = 0$
 $A_x = -200\text{ N}$ (or 200 N away from negative direction)

Answer:
 $A_x = 200\text{ N (away)}$
 $A_y = 0$
 $B_x = 200\text{ N}$

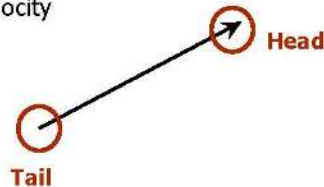
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1. The magnitude of the force $\vec{F}_1$ is 3 N. Resolve the force $\vec{F}_1$ into x - and y - components.



Recall:

- **Scalar:** has **magnitude only**. e.g., time, mass, temperature, distance
- **Vector:** a physical quantity that has both **magnitude** and **direction**. e.g., force, weight, velocity



Note: **The length of the vector** represents **the magnitude** of the vector.

- **Notation of Vector:** denoted by letters with arrows above it. e.g., $\vec{F}$, $\vec{v}$

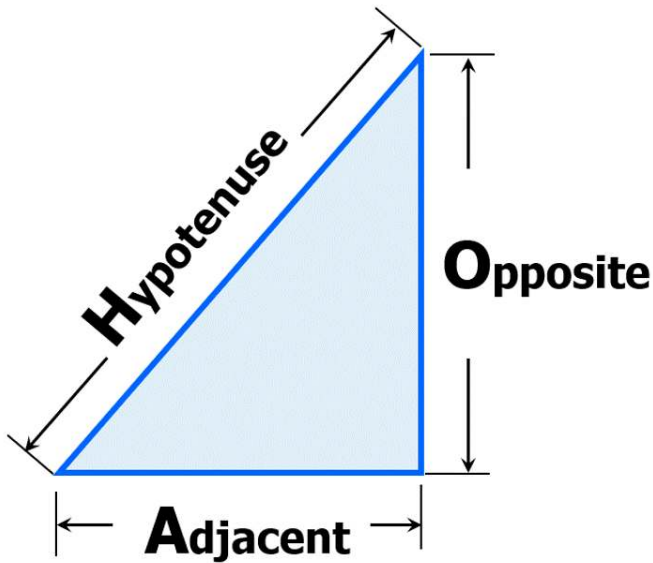
• Steps for Graphical Vector Addition

1. Draw the First Vector.
2. Place the Tail of the Second Vector at the Head of the First Vector.
3. Draw the Resultant Vector from the Tail of the First Vector to the Head of the Second Vector.

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• Trigonometry

Note that the trigonometry applies **only to Right Triangles**.



$$\sin \theta =$$

$$\cos \theta =$$

$$\tan \theta =$$

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Class Assignment

Topic 06 – 9

Submit a scanned copy of the practice problem you completed during class.

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Topic 07. Preparing Professional Engineering Slides

Effective communication is a vital skill in the engineering profession, and well-prepared slides are often the cornerstone of impactful presentations. This topic focuses on equipping students with the tools and strategies needed to create professional and polished slides tailored for engineering contexts. It emphasizes clarity, precision, and the appropriate integration of visuals.

In this chapter, you will learn:

1. **The Purpose of Professional Slides:** Understand how professional slides contribute to delivering clear, concise, and visually appealing presentations, critical for both academic and professional success.
2. **General Design Guidelines:** Explore essential principles for designing slides that maintain focus, readability, and professionalism in an engineering setting.
3. **Graphs, Tables, and Equations:** Gain insights into best practices for incorporating technical visuals and data effectively, highlighting their role in supporting your key messages.
4. **Practical Application:** Apply these guidelines by analyzing examples of good and bad slides to identify strengths and areas for improvement.

Mastering the art of slide preparation will not only help you excel in academic presentations but also prepare you for professional communication in the engineering field. This preparation ensures that you can present complex information effectively to diverse audiences, from peers to industry professionals.

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- Understand the purpose and significance of professional slides in engineering presentations.
- Learn general guidelines for designing clear and effective engineering slides.
- Explore best practices for integrating graphs, tables, and equations into engineering presentations.
- Apply Knowledge Through Practice.

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- **To communicate technical information clearly**

: present data, concepts, and solutions effectively for diverse audiences (technical and non-technical).

- **To enhance visual impact**

: Use diagrams, graphs, and tables to simplify complex information and engage the audience.

- **To facilitate collaboration**

: Provide a platform for discussing ideas and results in team meetings, conferences, or project reviews.

- **To support Decision-Making**

: Help stakeholders make informed decisions through well-organized and accurate information.

- **To demonstrate Professionalism**

: Reflect attention to detail and technical rigor, essential qualities for an engineer.

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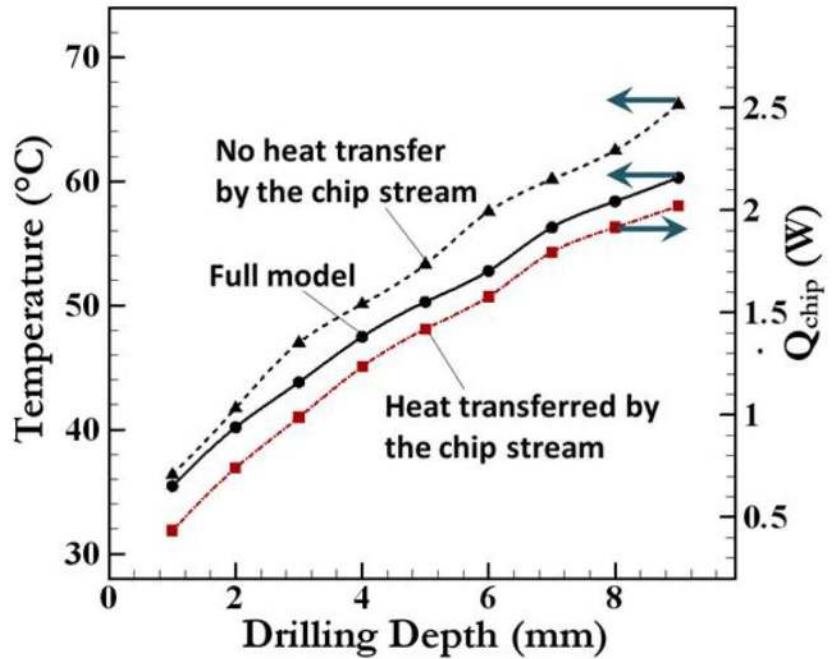
- **Keep it Simple and Clear**
 - Avoid clutter and excessive text; focus on key points.
 - Use bullet points or short phrases rather than full sentences.
- **Maintain Consistency**
 - Use a uniform font, color scheme, and slide layout throughout.
- **Use Visual Aids Effectively**
 - Incorporate graphs, tables, and diagrams to illustrate technical data.
 - Avoid overloading slides with too many visuals.
- **Follow a Logical Flow**
 - Arrange content to guide the audience logically through your presentation.
 - Include clear transitions between topics.
- **Acknowledge Sources**
 - Cite references for data, images, or graphs used in your slides.

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Tips

- Simplify Design.
- Label Clearly.
- Align Content Properly.
- Highlight Key Data.
- Ensure Legibility.
- Maintain Proportion and Scale.

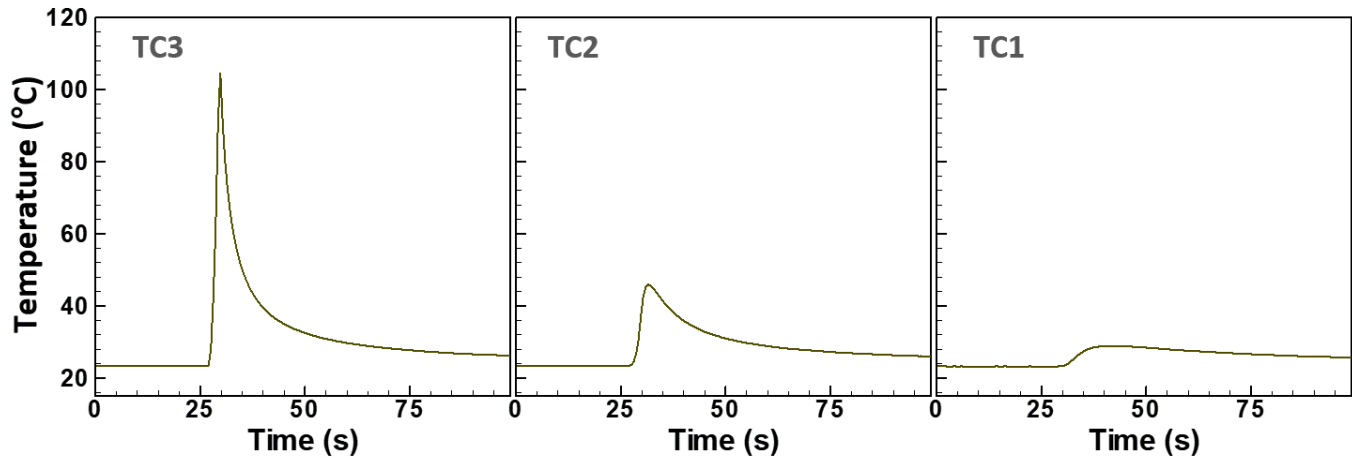
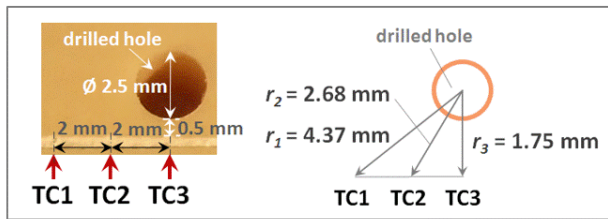
Example 1:



Lee et al. 2011. Med. Eng. Phys. 33 (10), 1234-1244.

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Example 2:



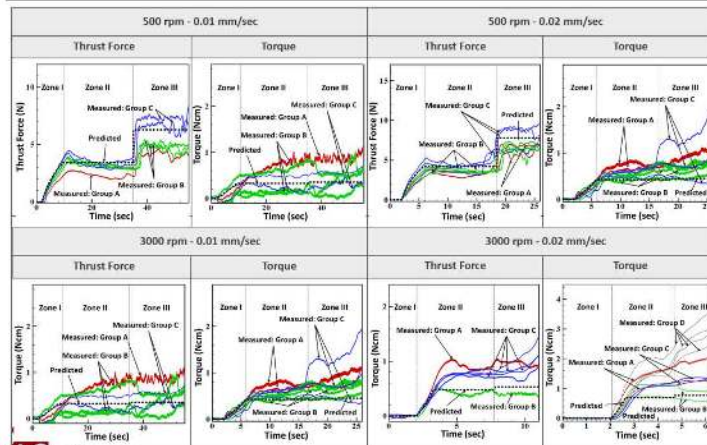
Lee *et al.* 2016. IMECE, V003T04A058

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Model Validation

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Example 3:

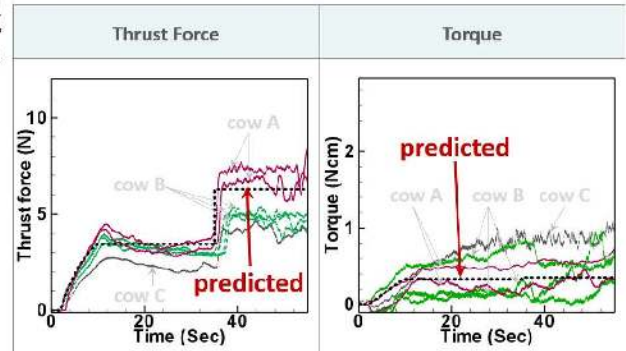


Example 4:

Mechanical Analysis: Experimental Validation

18

Mechanical Engineering
Campbell
Introduction-Objective-Thermal Modeling-Force Modeling-Force Model Validation-Thermal Experimentation-Conclusion-Future Work
Lee et al. 2012. J of Biomech, 45 (6), 1076-1083

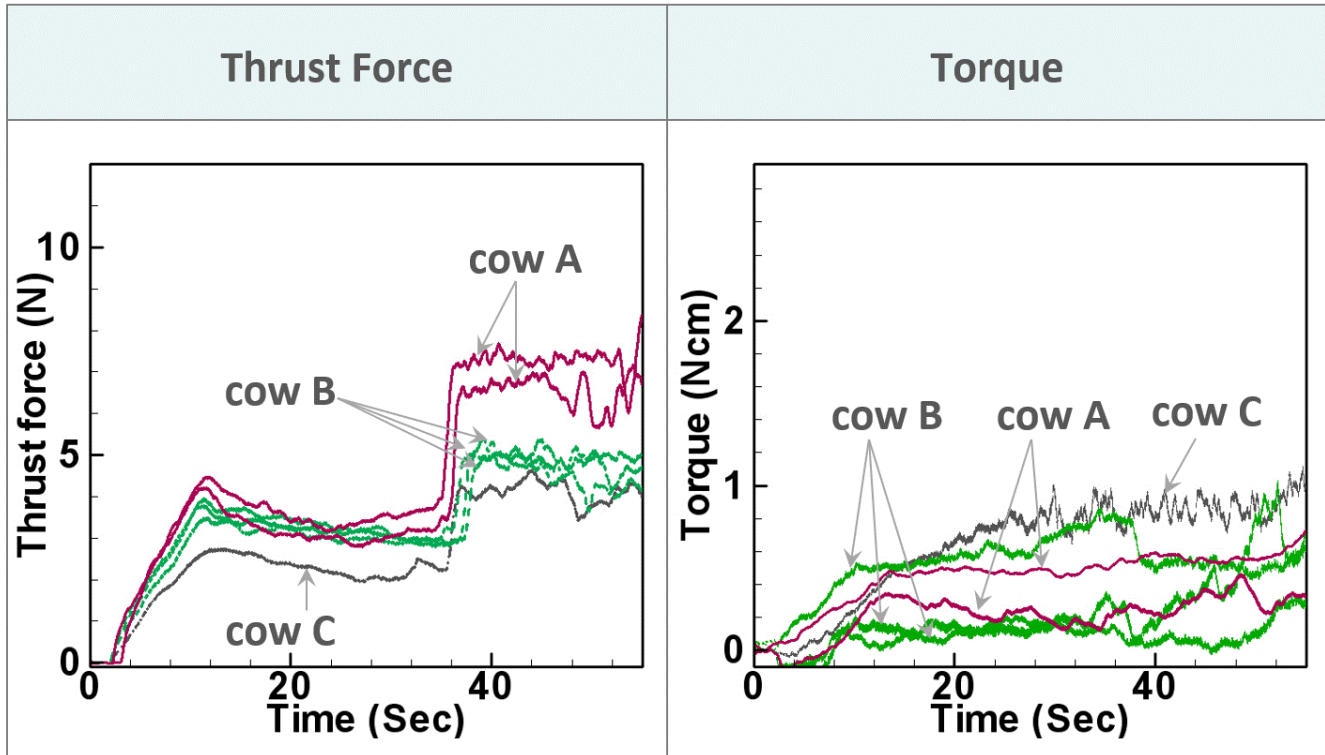


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Lee et al. 2012. J of Biomech, 45 (6), 1076-1083

Example 4:

• **Mechanical Analysis: Experimental Validation**



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Lee *et al.* 2012. J of Biomech, 45 (6), 1076-1083

Tips

- Keep it Simple.
- Use Descriptive Headers.
- Align Content Properly.
- Highlight Key Data.
- Ensure Legibility.

Example 1:

Case #	Location [mm]			Temperature [C]
1	1	3	1	10
2	1	4	5	15
3	2	3	4	15
4	4	4	5	20
5	5	3	4	31
6	6	4	5	32
7	7	3	4	25
8	8	4	5	35
9	9	3	4	66
10	10	4	5	53
11	11	3	4	23
12	12	4	5	25
13	13	3	4	26
14	14	4	5	39
15	15	3	4	23
16	16	4	5	23
17	17	3	4	24
18	18	4	5	25
19	19	3	4	15
20	20	4	5	15

Example 2:

Location	temperature
1	40
2	80
3	30
4	20

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Example 3:

Area	Surgery	Typical Drill Diameter (mm)	Typical Drilling Depth (mm)
Neurotology (Majdani et al., 2009)	Cochleostomy	1.3 – 1.8	27 – 35
Orthopaedic (AO surgery ref.)	Fracture Reduction	2.5 – 4.5	7 – 8
(Schaefer et al., 2015)	Femoral Neck Fracture	5.0	90 – 100
(Tomkins et al., 2013)	ACL Reconstruction	2.5	35 – 40
Orthodontic (Tardieu et al., 2003)	Dental Implant	2.0 – 4.5	12 - 15

Lee et al. 2020. J of Eng & Sci Med Diagn Ther , 3, 031006-1-7

Tips

- Use Consistent Formatting.
- Avoid Overcrowding.
- Highlight Key Elements.
- Explain Variable Notations.
- Avoid Distracting Backgrounds.

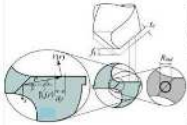
Example 1:

$$-\frac{\partial V}{\partial x} dx = \rho A dx \frac{\partial^2 w(x, t)}{\partial t^2}$$

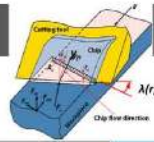
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Force Modeling

Cutting Lips



$d\vec{F}_{th} = d\vec{F}_f \cos \gamma_n \cos \eta_c - d\vec{F}_n \sin \gamma_n$	Thrust Force
$d\vec{F}_{cut} = d\vec{F}_f (\sin \eta_c \sin \lambda + \sin \gamma_n \cos \eta_c \cos \lambda) + d\vec{F}_n \cos \gamma_n \cos \lambda$	Cutting Force
$d\vec{F}_{lat} = -d\vec{F}_f (\sin \eta_c \sin \lambda + \sin \gamma_n \cos \eta_c \sin \lambda) + d\vec{F}_n \cos \gamma_n \sin \lambda$	Lateral Force



Example 2:

	Elemental forces on the cutting lip	Total forces on the cutting lip
Thrust	$d\vec{F}_z = d\vec{F}_{th} \frac{\cos \beta_w \sin p}{\cos \lambda} - d\vec{F}_{lat} \frac{\cos p}{\cos \lambda}$	$\vec{F}_z = \sum_{lips} \sum_{elements} d\vec{F}_z$
Torque	$d\vec{M}_z = r_{el} d\vec{F}_{cut}$	$\vec{M}_z = \sum_{lips} \sum_{elements} d\vec{M}_z$

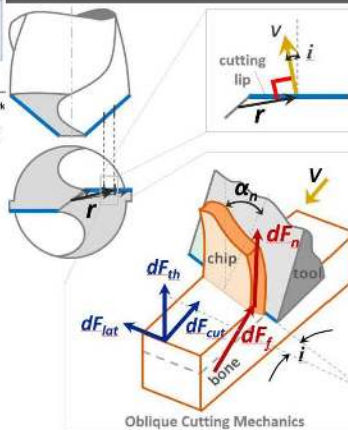


Mechanical Engineering
 Curriculum: Introduction—Objective—Thermal Modeling—Force Modeling—Force Model Validation—Thermal Experimentation—Conclusion—Future Work
 Lee et al. 2012. J of Biomech, 45 (6), 1076-1083

Example 3:

Force Modeling: Cutting Lips

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Elemental Forces along the Cutting Lips

$$d\vec{F}_{cut}$$

$$d\vec{F}_{th} = \int (d\vec{F}_n, d\vec{F}_f)$$

$$d\vec{F}_{lat}$$

Elemental Thrust Force and Torque

$$d\vec{F}_{thrust} = \int (d\vec{F}_{th}, d\vec{F}_{lat})$$

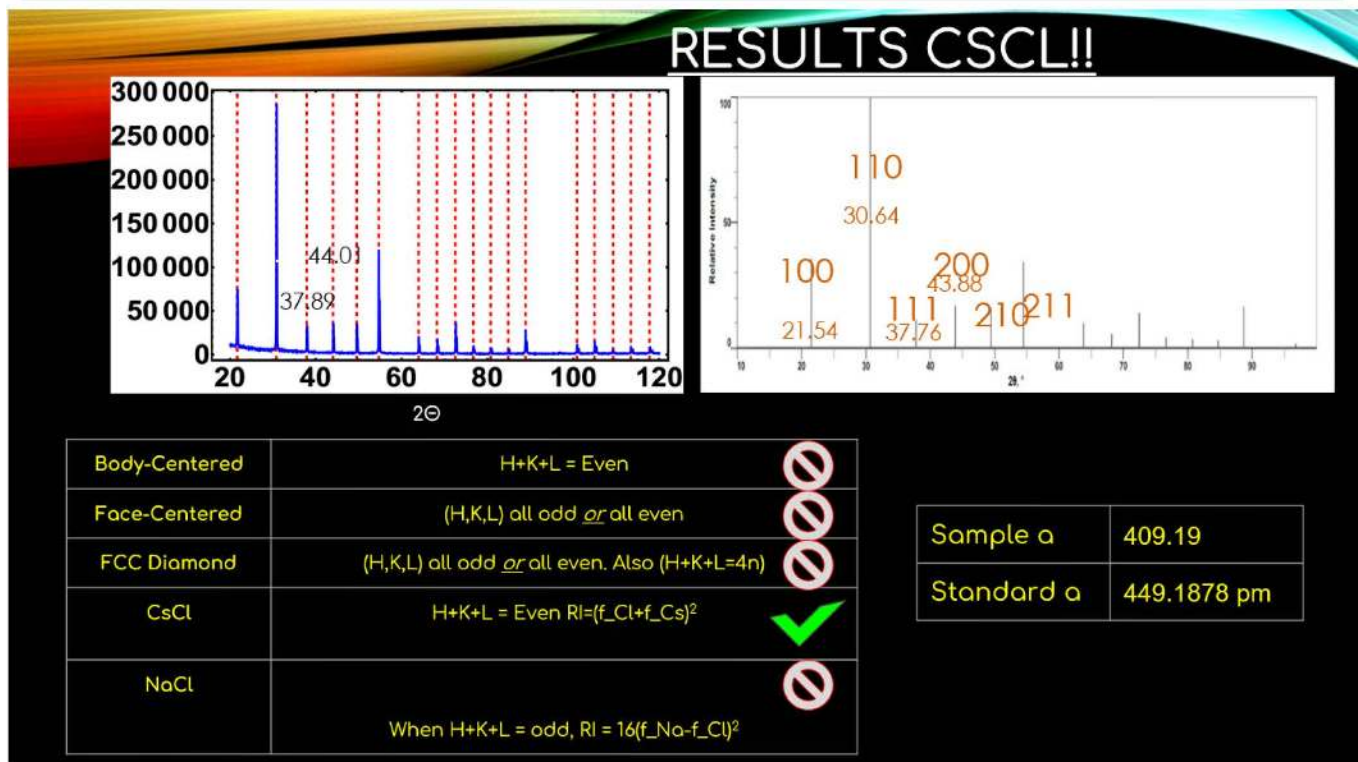
$$d\vec{T} = \int (r, \vec{F}_{cut})$$

Total Drilling Forces

$$\vec{F}_{thrust} = \sum_{lips} \sum_{elements} d\vec{F}_{thrust}$$

$$\vec{T} = \sum_{lips} \sum_{elements} d\vec{T}$$

Identify and list at least three issues or areas of improvement in this slide.



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