COMP-AID PROB SOLVING AGEN112 SEC 001 Spring 2023

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AGEN / BSEN 112 – Computer-Aided Problem Solving

 Department of Biological Systems Engineering

University of Nebraska-Lincoln

COURSE SYLLABUS

Wednesday and Friday 1:00-1:50 PM Chase Hall room 116

INSTRUCTOR

Dr. Rossana Villa Rojas

Office hours: Wednesdays 2 to 4 pm Chase Hall room 237 or by appointment

Office: 263 Food Innovation Center

email: **rvillarojas2@unl.edu (mailto:rvillarojas2@unl.edu)**

TEACHING ASSISTANTS

Shubham Bery

Office hours: Tuesdays 2 to 3 pm, 203 Splinter Laboratory or by appointment

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GRADERS

Claire Weir

Sean Poppens

CATALOG DESCRIPTION:

AGEN/BSEN 112: Computer-Aided Problem Solving (2 cr II) Lect 2. Prerequisite: AGEN/BSEN 100 and high school physics or permission. Problem solving techniques and procedures through the use of Excel and graphical methods and MATLAB. Emphasis on problem/solution communication with topics and problems from agricultural engineering and biological systems engineering.

OBJECTIVES:

Upon successful completion of this course a student will be able to:

1. Use knowledge and skills to solve problems related to science and engineering.
2. Employ modern engineering tools (e.g., basics of spreadsheets and MATLAB).
3. Choose which Excel function and MATLAB command is most appropriate to use in solving individual science and engineering problems.
4. Use the engineering problem solving process effectively to communicate solution processes and answers.

TEXTBOOK AND REQUIRED MATERIALS:

No textbook will be required. All needed sources and references will be provided electronically for download.

Students must have access to Excel (Office 2010+) and MATLAB (Release 2018+).

COURSE OUTLINE: The tentative course outline is as follows:

 Schedule is subject to change. Changes will be announced in class, emailed to students, and posted on Canvas.

Week	Date	Weekday	Module	Topic	Delivery	Homework	Homework points	Homework due date
1	25-Jan	W		Class intro and Excel basics	Lecture			
1	27-Jan	F	1. Introduction and engineering concepts review	Excel basics/Dimensions, units and conversions	recitation			
2	1-Feb	W		Excel basics/Significant figures, precision and accuracy	recitation	HM1: Excel basics	30	8 - Feb
2	3-Feb	F	2. Engineering design and problem solving	Excel basics/Significant figures, precision and accuracy	Lecture/recitation			
3	8-Feb	W		MATLAB basics	Lecture/recitation	HM2: MATLAB	30	15 - Feb
3	10-Feb	F		MATLAB basics	Lecture/recitation			
4	15-Feb	W		Importing CSV file to Excel	recitation			
4	17-Feb	F		Importing CSV file to Excel	recitation			
5	22-Feb	W		Importing CSV file to MATLAB	recitation	Project M1: Framing your problem	25	8 - March
5	24-Feb	F		Importing CSV file to MATLAB/The process of engineering design and how to frame problems	recitation/Lecture	HM3: Evaluation of units and dimensions	10	22 - March
6	1-Mar	W		The process of engineering design and how to frame problems	Lecture			
6	3-Mar	F		The process of engineering design and how to frame problems (Group work)		HM 4: Problem analysis	40	24- March
7	8-Mar	W		*Stakeholder meeting and tour: Understand*	Lecture	Project M2: problem background and methodology	25	31-March

#	Date	Day		Topic		Assignment	Points	Due
				problem and client needs				
7	10-Mar	F	3. Computation tools for problem solving (flipped classroom)	Data collection methods				
8	15-Mar	W		Spring break				
8	17-Mar	F						
	22-Mar	W		Excel sorting/filters/pivot tables				
	24-Mar	F		MATLAB sorting/filters	recitation	HM 5: Sorting and filters/pivot tables	40	5 - April
9	29-Mar	W		Excel Logic statements	recitation			
9	31-Mar	F		MATLAB Logic statements	recitation	HM 6: Logic statements	40	12- April
10	5-Apr	W		*Stakeholder meeting: project progress, proposed data processing*		Project M3: Your data analysis plan and preliminary results (including tables and graphs)	25	28 - April
10	7-Apr	F		Data analysis and basic statistics	Lecture			
11	12-Apr	W		Data analysis and basic statistics	recitation	HM 7: Data analysis and statistics	40	21 - Apr
11	14-Apr	F		Types of charts and graphs and curve fitting	Lecture			
12	19-Apr	W		Excel graphs/charts / curve fitting	recitation			
12	21-Apr	F		Excel graphs/charts / curve fitting	recitation			
13	26-Apr	W		MATLAB graphs/charts	recitation			
13	28-Apr	F		MATLAB graphs/charts	recitation	HM 8: Graph charts and curve fitting	40	5 - May
14	3-May	W		*Stakeholder meeting: project progress looking at data*	recitation	Project M4: Project results, conclusions and recommendations	25	10 - May
14	5-May	F		In-class Group-work session: finalizing projects, posters	in-class group work	Project M5: poster	50	10 - May
15	10-May	W		In-class Group-work session: finalizing projects, report	in-class group work			
15	12-May	F		In-class Group-work session: finalizing projects, report	in-class group work			
16	18-May	Th		Mini-conference (poster presentation) Final written project report due at time and date of final exam				

GRADING SYSTEM:

Component of work	Contribution to course average (points)	Notes
Attendance/Participation	180	6 points per class period
Homework	270	8 individual assignments

Pre-class quizzes	25	7 quizzes
Project milestones	100	4 group assignments
Project poster	50	For mini-conference with stakeholders
Project report	350	
Performance as team member	20	
Class survey	5	
Total	**1000**	

The semester average will be determined as a composite of attendance, homework, and project grades. The portion each component contributes to the course average is shown in the table above. The grade assigned will be based on the semester average as shown in the table below. The instructor reserves the right to adjust the scale. If the student requires clarifications with grades on any assignment, homework or activity please contact the instructor directly.

Semester Average	Grade	Semester Average	Grade	Semester Average	Grade
≥97.0%	A+	≥83.0%	B	≥70.0%	C-
≥93.0%	A	≥80.0%	B-	≥67.0%	D+
≥90.0%	A-	≥77.0%	C+	≥63.0%	D
≥87.0%	B+	≥73.0%	C	≥60.0 %	D-
				<60.0%	F

Pass/No Pass Option -- Students enrolled under this option must achieve at least the percentage required for a C letter grade to receive a passing grade (P). See Grading Policies under Academic Policies & Procedures in the Undergraduate Bulletin online.

University policy regarding marks of I (incomplete) and W (withdraw) will be followed in this course. See Grading Policies under Academic Policies & Procedures in the Undergraduate Bulletin online.

HOMEWORK:

Unit 1 homework is to be completed by and turned in according to the instructor's specified format. Unit 2 homework is to be done using engineering computational tools (Excel and MATLAB) and must be turned in as announced for the particular assignment, either in Excel or MATLAB format. All homework is to be turned in at the beginning of class on the due date (1:00 p.m. sharp). Assignments not submitted at the scheduled time will be worth 1/2 credit if submitted within one week of the scheduled time. Special extraneous circumstances may be discussed on an individual basis if necessary.

PROJECTS:

One group project will be assigned during the semester and will require the use of both computational tools. Files submissions for MATLAB should use .m file, Excel submission .xls or .xlsx files. Additional files/formats may also be required.

ATTENDANCE/PARTICIPATION POLICY:

It is important for you to attend class. Attendance will be counted during lectures and/or responses to in-class activities and work group sessions depending on the structure of the particular class period. Many of the PowerPoint presentations used in class by instructors and guests will be placed on Canvas. However, the PowerPoint presentations typically provide only the minimum information, and discussions during class. Answers to questions asked by students, examples worked in class, and other information may NOT be in PowerPoint presentations placed in Canvas. If you are unable to come to class due to circumstance beyond your control please contact me to make appropriate arrangements.

 Each student is responsible for everything discussed in class sessions. If, for any reason, you are not able to attend class or participate due to illness, unforeseen circumstance, computer connection issue, or other reason, please communicate with the instructors immediately.

If in-person classes are canceled, you will be notified of the instructional continuity plan for this class by Canvas announcement.

CoVid-19 CLASSROOM POLICY

Given the current transmission level of COVID-19 in our community, I respectfully request that you join me in wearing a face covering during our classes.

UNL Course Policies and Resources

Students are responsible for knowing the university policies and resources found on this page (**https://go.unl.edu/coursepoliciesLinks to an external site. (https://go.unl.edu/coursepolicies)**):

- University-wide Attendance Policy
- Academic Honesty Policy (see Student Code of Conduct, Section B. Conduct - rules and Regulations, 1. Acts of Academic Dishonesty)
- Services for Students with Disabilities (see **Services for Students with DisabilitiesLinks to an external site. (https://www.unl.edu/ssd/)**)
- Mental Health and Well-Being Resources
- Final Exam Schedule
- Fifteenth Week Policy
- Emergency Procedures
- Diversity & Inclusiveness
- Title IX Policy
- Other Relevant University-Wide Policies

The BSE Department process for grade and academic dishonesty appeals can be found at **http://bse.unl.edu/academicadvising-index (http://bse.unl.edu/academicadvising-index)** . Students are encouraged to contact the instructor for clarification of these guidelines if they have questions or concerns.

For up to date Covid-19 updates and policies please visit **https://covid19.unl.edu/ (https://covid19.unl.edu/)**

Course Summary:

Date	Details	Due
Fri Jan 28, 2022	📝 **Jan 28 In class - SI units class 2 (https://canvas.unl.edu/courses/143566/assignments/1423930)**	due by 3pm
Wed Feb 16, 2022	📝 **Feb 16 In class - SOLVEM method and Excel basics (https://canvas.unl.edu/courses/143566/assignments/1423918)**	due by 3pm
Fri Feb 18, 2022	📝 **Feb 18 In class - SOLVEM method and Excel basics 2 (https://canvas.unl.edu/courses/143566/assignments/1423919)**	due by 3pm
Fri Feb 25, 2022	📄 **Guest speaker: Luke Prosser**	to do: 1pm
Wed Mar 2, 2022	📄 **pre-class: Basic statistics and linear regression**	to do: 1pm
	📝 **March 2 In class - Data collection (https://canvas.unl.edu/courses/143566/assignments/1423932)**	due by 3pm
Fri Mar 4, 2022	📝 **March 4 In class: Data Analysis & Basic Statistics (https://canvas.unl.edu/courses/143566/assignments/1423933)**	due by 3pm
Wed Mar 9, 2022	📄 **Solutions to in-class activity for Excel basic stats and regression analysis**	to do: 11:59pm
Thu Mar 10, 2022	📄 **Pre-class: Charts**	to do: 2pm
Fri Mar 11, 2022	📄 **Guest speaker: Aaron Vancura**	to do: 1pm
Fri Mar 18, 2022	📄 **Guest lecturer: Dr. Grace Danao- Graphs and charts**	to do: 1pm
Wed Mar 23, 2022	📄 **Pre-class: Tables, format, sorting and filters**	to do: 1pm
Wed Mar 30, 2022	📄 **Guest speaker: Deidre Rauch**	to do: 1pm
Fri Apr 1, 2022	📝 **April 1 In class- Tables: format, sorting and filters (https://canvas.unl.edu/courses/143566/assignments/1423895)**	due by 3pm

Date	Details	Due
	📝 **April 1 In class- Tables: format, sorting and filters Copy** (https://canvas.unl.edu/courses/143566/assignments/1423896)	due by 3pm
Wed Apr 6, 2022	📝 **April 6 In class- Tables: format, sorting and filters 2** (https://canvas.unl.edu/courses/143566/assignments/1423901)	due by 3pm
Fri Apr 8, 2022	📄 **Guest speaker: Julia Burchell**	to do: 1pm
Wed Apr 13, 2022	📝 **Homework 6: problem analysis and basic statistics** (https://canvas.unl.edu/courses/143566/assignments/1423925)	due by 1pm
	📝 **April 13 In class- Tables: format, sorting and filters 3** (https://canvas.unl.edu/courses/143566/assignments/1423897)	due by 3pm
Fri Apr 15, 2022	📄 **Guest speaker: Bethany Brittenham**	to do: 1pm
Wed Apr 20, 2022	📝 **April 20 In class- MATLAB Tables: format, sorting and filters** (https://canvas.unl.edu/courses/143566/assignments/1423898)	due by 3pm
Fri Apr 22, 2022	📝 **April 22 In class- Charts and graphs** (https://canvas.unl.edu/courses/143566/assignments/1423899)	due by 3pm
Mon Apr 25, 2022	📝 **Sign up to your group for final project** (https://canvas.unl.edu/courses/143566/assignments/1423936)	due by 11:59pm
Wed Apr 27, 2022	📝 **April 27 In class- Charts and graphs April 27** (https://canvas.unl.edu/courses/143566/assignments/1423900)	due by 3pm
Fri Apr 29, 2022	📄 **Guest speaker: Dr. Alec McCarthy**	to do: 1pm
	📄 **Links to intro videos**	to do: 11:59pm
Mon May 2, 2022	📝 **Homework 7: sorting filters and pivot tables** (https://canvas.unl.edu/courses/143566/assignments/1423926)	due by 11:59pm
Wed May 4, 2022	📝 **May 4 In class- Bars scatter plots and logic functions** (https://canvas.unl.edu/courses/143566/assignments/1423934)	due by 3pm
	📄 **Video tutorials: graph and charts in Excel**	to do: 11:59pm
Fri May 6, 2022	📝 **In class- Logic functions May 6** (https://canvas.unl.edu/courses/143566/assignments/1423927)	due by 3pm
	📄 **Video tutorials MATLAB graphs and charts**	to do: 11:59pm
	📝 **Extra credit: charts and graphs** (https://canvas.unl.edu/courses/143566/assignments/1423917)	due by 11:59pm
Tue May 10, 2022	📝 **Final Project** (https://canvas.unl.edu/courses/143566/assignments/1423921)	due by 3pm
Fri May 13, 2022	📄 **Undergraduate research links**	to do: 11:59pm
Fri Jan 27, 2023	📝 **Jan 27 In class - Excel basics Cell addressing and ASTM problem** (https://canvas.unl.edu/courses/143566/assignments/1423920)	due by 3pm
	📝 **Jan 27 In class - Excel basics Cell addressing and ASTM problem** (https://canvas.unl.edu/courses/143566/assignments/1423920)	due by 11:59pm

Date	Details	Due
	(1 student)	
	📝 **Attendance: January 27** **(https://canvas.unl.edu/courses/143566/assignments/1453240)**	due by 11:59pm
Mon Jan 30, 2023	📝 **Jan 27 In class - Excel basics Cell addressing and ASTM problem** **(https://canvas.unl.edu/courses/143566/assignments/1423920)** (3 students)	due by 11:59pm
Tue Jan 31, 2023	📝 **Jan 27 In class - Excel basics Cell addressing and ASTM problem** **(https://canvas.unl.edu/courses/143566/assignments/1423920)** (1 student)	due by 11:59pm
Wed Feb 1, 2023	🚀 **In-class Feb 1 A: dimensions and units** **(https://canvas.unl.edu/courses/143566/assignments/1455200)**	due by 2pm
	🚀 **in-class Feb 1 B: Fundamental and derived units** **(https://canvas.unl.edu/courses/143566/assignments/1455195)**	due by 2pm
	🚀 **In-class Feb 1 C: prefix conversion** **(https://canvas.unl.edu/courses/143566/assignments/1455199)**	due by 2pm
	📝 **Feb 1 In class - Unit conversions** **(https://canvas.unl.edu/courses/143566/assignments/1423929)**	due by 4pm
	📝 **Feb 1 In class - Unit conversions** **(https://canvas.unl.edu/courses/143566/assignments/1423929)** (1 student)	due by 11:59pm
Fri Feb 3, 2023	🚀 **In- class Feb 3 Quiz A: reasonable specific gravity** **(https://canvas.unl.edu/courses/143566/assignments/1456037)**	due by 2pm
	🚀 **In- class Feb 3 Quiz C: Accurate and precise measurements** **(https://canvas.unl.edu/courses/143566/assignments/1456115)**	due by 2pm
	🚀 **In-class Feb 3 B: reasonable horsepower** **(https://canvas.unl.edu/courses/143566/assignments/1456046)**	due by 2pm
	📝 **Feb 1 In class - Unit conversions** **(https://canvas.unl.edu/courses/143566/assignments/1423929)** (1 student)	due by 11:59pm
	📝 **Jan 27 In class - Excel basics Cell addressing and ASTM problem** **(https://canvas.unl.edu/courses/143566/assignments/1423920)** (3 students)	due by 11:59pm
	📝 **Jan 27 In class - Excel basics Cell addressing and ASTM problem** **(https://canvas.unl.edu/courses/143566/assignments/1423920)** (1 student)	due by 11:59pm
Mon Feb 6, 2023	🚀 **In- class Feb 3 Quiz A: reasonable specific gravity** **(https://canvas.unl.edu/courses/143566/assignments/1456037)** (1 student)	due by 11:59pm
	🚀 **In- class Feb 3 Quiz C: Accurate and precise measurements** **(https://canvas.unl.edu/courses/143566/assignments/1456115)** (1 student)	due by 11:59pm
	🚀 **In-class Feb 3 B: reasonable horsepower** **(https://canvas.unl.edu/courses/143566/assignments/1456046)** (1 student)	due by 11:59pm

Date	Details	Due
Wed Feb 8, 2023	🚀 **In-class Feb 8 MATLAB BASICS A: Variables** **(https://canvas.unl.edu/courses/143566/assignments/1457395)**	due by 11:59pm
	🚀 **In-class Feb 8 MATLAB BASICS B: Vectors & Matrices** **(https://canvas.unl.edu/courses/143566/assignments/1455441)**	due by 11:59pm
Fri Feb 10, 2023	🚀 **Attendance FEb 10** **(https://canvas.unl.edu/courses/143566/assignments/1458862)**	due by 2pm
	🚀 **In-class Feb 10 MATLAB BASICS D: Operations** **(https://canvas.unl.edu/courses/143566/assignments/1457420)**	due by 4pm
	🚀 **In-class Feb 10 MATLAB BASICS C: Indices** **(https://canvas.unl.edu/courses/143566/assignments/1457414)**	due by 4pm
	📝 **Extra credit 1: Personalized study plan (extra credit)** **(https://canvas.unl.edu/courses/143566/assignments/1423935)**	due by 11:59pm
Mon Feb 13, 2023	📝 **Homework 1: Excel basics, dimensions, units, significant figures, accuracy and precision** **(https://canvas.unl.edu/courses/143566/assignments/1423923)**	due by 11:59pm
Tue Feb 14, 2023	📝 **Homework 1: Excel basics, dimensions, units, significant figures, accuracy and precision** **(https://canvas.unl.edu/courses/143566/assignments/1423923)** (3 students)	due by 11:59pm
Wed Feb 15, 2023	📝 **Homework 1: Excel basics, dimensions, units, significant figures, accuracy and precision** **(https://canvas.unl.edu/courses/143566/assignments/1423923)** (1 student)	due by 11:59pm
	📝 **Homework X: Professional e-mail to advisor to develop professional competencies** **(https://canvas.unl.edu/courses/143566/assignments/1423924)**	due by 11:59pm
	📝 **In-class Feb 15: import to Excel and convert units** **(https://canvas.unl.edu/courses/143566/assignments/1458841)**	due by 11:59pm
Fri Feb 17, 2023	📝 **Homework 2: MATLAB Basics** **(https://canvas.unl.edu/courses/143566/assignments/1423931)**	due by 1pm
	📝 **Homework 3: Unit analysis** **(https://canvas.unl.edu/courses/143566/assignments/1457353)**	due by 11:59pm
	📝 **Learning Strategies Self-Assessment** **(https://canvas.unl.edu/courses/143566/assignments/1460592)**	due by 11:59pm
Tue Feb 21, 2023	🚀 **Reflection 0** **(https://canvas.unl.edu/courses/143566/assignments/1456547)**	due by 11:59pm
	📝 **Reflection 0 Instructions and Rubric** **(https://canvas.unl.edu/courses/143566/assignments/1456546)**	due by 11:59pm
Wed Feb 22, 2023	🚀 **In-class Feb 22: favorite color** **(https://canvas.unl.edu/courses/143566/assignments/1462956)**	due by 1:20pm
Thu Feb 23, 2023	📝 **In-class Feb 15: import to Excel and convert units** **(https://canvas.unl.edu/courses/143566/assignments/1458841)** (2 students)	due by 11:59pm
Fri Feb 24, 2023	📝 **In-class Feb 24: import to MATLAB and convert units** **(https://canvas.unl.edu/courses/143566/assignments/1458842)** (2 students)	due by 11:59pm

Date	Details	Due
	📝 **In-class Feb 24: import to MATLAB and convert units** **(https://canvas.unl.edu/courses/143566/assignments/1458842)**	due by 11:59pm
Tue Feb 28, 2023	📝 **Extra credit 2: Husker Power** **(https://canvas.unl.edu/courses/143566/assignments/1423916)**	due by 11:59pm
Wed Mar 1, 2023	🚀 **In-class March 1 SOOLVEM2C: Quiz A** **(https://canvas.unl.edu/courses/143566/assignments/1462935)**	due by 2pm
	🚀 **In-class March 1 SOOLVEM2C: Quiz B** **(https://canvas.unl.edu/courses/143566/assignments/1462937)**	due by 2pm
	🚀 **In-class March 1 SOOLVEM2C: Quiz C** **(https://canvas.unl.edu/courses/143566/assignments/1463168)**	due by 2pm
	📝 **Homework 2: MATLAB Basics** **(https://canvas.unl.edu/courses/143566/assignments/1423931)** (1 student)	due by 11:59pm
Fri Mar 3, 2023	📝 **Homework 1: Excel basics, dimensions, units, significant figures, accuracy and precision** **(https://canvas.unl.edu/courses/143566/assignments/1423923)** (1 student)	due by 11:59pm
	📝 **In-class Feb 24: import to MATLAB and convert units** **(https://canvas.unl.edu/courses/143566/assignments/1458842)** (1 student)	due by 11:59pm
Fri Mar 10, 2023	🚀 **Reflection 1** **(https://canvas.unl.edu/courses/143566/assignments/1463617)**	due by 11:59pm
	📝 **Reflection 1 Instructions and Rubric** **(https://canvas.unl.edu/courses/143566/assignments/1463616)**	due by 11:59pm
	📝 **Attendance: April 22** **(https://canvas.unl.edu/courses/143566/assignments/1423902)**	
	📝 **Attendance: April 29** **(https://canvas.unl.edu/courses/143566/assignments/1423903)**	
	📝 **Attendance: April 8** **(https://canvas.unl.edu/courses/143566/assignments/1423904)**	
	📝 **Attendance: February 1** **(https://canvas.unl.edu/courses/143566/assignments/1456408)**	
	📝 **Attendance: February 10** **(https://canvas.unl.edu/courses/143566/assignments/1464323)**	
	📝 **Attendance: February 15** **(https://canvas.unl.edu/courses/143566/assignments/1464390)**	
	📝 **Attendance: February 22** **(https://canvas.unl.edu/courses/143566/assignments/1464391)**	
	📝 **Attendance: February 24** **(https://canvas.unl.edu/courses/143566/assignments/1464392)**	
	📝 **Attendance: February 3** **(https://canvas.unl.edu/courses/143566/assignments/1456410)**	
	📝 **Attendance: February 8** **(https://canvas.unl.edu/courses/143566/assignments/1458155)**	

Date	Details	Due
	📝 **Attendance: January 25** **(https://canvas.unl.edu/courses/143566/assignments/1423906)**	
	📝 **Attendance: March 1** **(https://canvas.unl.edu/courses/143566/assignments/1464393)**	
	🚀 **Jan 25 Experience with computational tools** **(https://canvas.unl.edu/courses/143566/assignments/1451594)**	
	🚀 **Jan 27 Dimensions and units** **(https://canvas.unl.edu/courses/143566/assignments/1452879)**	
	🚀 **Jan 27 Excel basics: cell addressing** **(https://canvas.unl.edu/courses/143566/assignments/1451614)**	