



COLLEGE OF ENGINEERING AND TECHNOLOGY

OUTCOMES-BASED EDUCATION COURSE SYLLABUS **RES311 METHODS OF RESEARCH FOR MECHANICAL ENGINEERING** MECHANICAL ENGINEERING DEPARTMENT First Semester, A.Y. 2022-2023

VISION, MISSION, GOALS AND OBJECTIVES

Vision

A research-based academic institution committed to excellence and service in nurturing globally competitive workforce towards sustainable development.

Mission

Romblon State University shall nurture an academic environment that provides advanced education, higher technological and professional instruction and technical expertise in agriculture and fisheries, forestry, engineering and technology, education, humanities, sciences and other relevant fields of study and collaborate with other institutions and communities through responsive, relevant and research-based extension services.

Core Values

1. Stewardship
2. Competence
3. Resilience
4. Integrity
5. Balance
6. Excellence
7. Service

Goals

The College of Engineering and Technology's goal is to provide relevant and quality training for students in engineering, technology and related fields consistently to satisfy the national development trusts.



Objectives

All engineering programs must be defined consistent with the vision and mission of the university, The College endeavors to:

- Produce graduates with the necessary theoretical knowledge of mathematics and natural sciences as well as the background knowledge needed by them to acquire the experience and practical skills required of professional engineers and technicians;
- Educate students for their careers as engineers and technicians, to enable them to contribute to the developmental effort of the country as entrepreneurs or competent professionals;
- Educate students imbued with good moral and ethical values and the acute sense of awareness of the conservation of the environment for the sustainable development of the country;
- Provide students instruction in both theoretical and practical aspects of engineering and technology and exposure to industrial setting in the form of field experience provide a well-rounded engineering and technical education that draws upon resources of a comprehensive research university to attract outstanding undergraduate students in selected engineering fields;
- Conduct quality research in selected areas, enabling faculty members and students to keep pace with new developments and ensuring that the newest concepts are taught in its courses; and
- Serve the needs of the University, industry, government, and the general populace by making its facilities and faculty expertise accessible.

Course Description:

This course covers the study of the methodologies used in conducting an engineering research. It includes the types and application of research, characteristics of a good research, research design, research instrument and data gathering procedures and statistical analysis. It also deals with the study of writing a research proposal or an undergraduate thesis proposal. It includes the basic concepts, principles, procedures and methods of a research and thesis writing, as well as the content and structure of a thesis proposal.

Course Code: RES 311

Credit Units: 1 unit (1 hr lecture and 0 hr laboratory)

Prerequisites: English 3 (Technical Communication), Probability and Statistics

Program Outcomes:

- a. to apply knowledge of mathematics, science and to solve complex mechanical engineering problems;
- b. to design and conduct experiments, as well as to analyze and interpret data;
- c. to design a system, component or process to meet desired needs within realistic constraints, in accordance with standards;
- d. to function in multi-disciplinary and multi-cultural teams;
- e. identify, formulate, and solve complex mechanical engineering problems



- f. an understanding of professional, social and ethical responsibility;
- g. communicate effectively;
- h. understand the impact of mechanical engineering solutions in a global, economic, environmental and societal context;
- i. recognize the need for, and engage in life-long learning;
- j. know contemporary issues;
- k. an ability to use techniques, skills and modern engineering tools necessary for mechanical engineering practice; and
- l. know and understand engineering and management principles as a member and leader of a team; and to manage projects in a multidisciplinary environment.

Course Outcomes Link to Program Outcomes:

Course Outcomes (Co) For Res311 Methods of Research for Mechanical Engineering in relation to Program Outcomes

Course Outcomes(COs) : At the end of the course, the student will be able to:													
		a	b	c	d	e	f	g	h	i	j	k	l
CO-1	Understand the research process, methods and procedures;				I	I	I						
CO-2	Identify key issues regarding research in mechanical engineering studies and develop skills to search online and offline sources to carry out literature review;								I	I			
CO-3	Define an appropriate research topic by recognizing a suitable research area and thereby, formulate research questions/problems accordingly, by describing the rationale and research design and apply appropriate statistical tools;					I	I		I				
CO-4	Distinguish between various aspects of quantitative, qualitative, and mixed-methods research in mechanical engineering; and				I	I	I		I				
CO-5	Undertake or write a research proposal and develop skills in thesis writing.				I	I	I		I	I			

Note: I - An introductory course to an Outcome



E – Enabling

D - Demonstrate

Course Requirements:

- Online Attendance/Login
- Online Class participation thru Discussion Forum
- Online Assignments/Exercises
- Online Quizzes/Major Examinations
- Group Work Projects/Project Progress Reports

Course Policies:

- Online login/participation is necessary for each student to obtain maximum benefits for instruction. It is expected that the students regularly visit the websites (Weebly, Google Classroom/Meet-up; and Canvas or Moodle are optional platforms); and active participation in the online discussion/forums will be monitored regularly. Observe proper online etiquette (politeness) in posting messages in the discussion forums.
- Projects and online homework/assignments must be submitted on time. Point deduction will apply to late submission of individual projects and homework/assignments.
- Online quizzes will be given on a specified time and to be announced ahead of time. Make-up online quizzes will be given only for those who have valid reasons of missing the quizzes/examinations.
- Online major examinations (Mid-term and Final) are optional and to be announced ahead of time. Make-up online examinations will be given depending on the availability of the students. It might be given on-site or face-face provided that necessary arrangements will be made.
- **Students are required to have a notebook for the subject.** It is expected that all students will take notes during class and will study these notes. Handouts should be downloaded or photocopied. Assignments will be handwritten in the notebook and images/photos of these assignments will be submitted electronically via Google Classroom or ARAL system.
- No sharing of homework/assignments electronically or any means of copying others outputs.
- Personal laptops, cell phones and other electronic gadgets are strongly encouraged to use for the online learning. Visit to computer shops are still acceptable but maintain social distancing and wearing ng face masks/shields.
- Face-to-face group studying and peer teaching are also encouraged to enhance the knowledge and skills but proper protocols such as social distancing and wearing of face masks and shields will be strictly observed.
- Any form of online cheating will not be tolerated. Any violation will be dealt properly.
- **Plagiarism is not tolerated in the preparation of written reports, thus proper citation and referencing are necessary.**



Students with Special Needs

Students who have any disability that might affect their performance in the class are encouraged to speak with the instructor early in the semester.

Course Grading System

Grading will be as follows:

Online Attendance/Class Participation	10%
Homework/Assignment/Reaction Paper	20%
Quiz	5%
Group Work/Output	40%
Midterm and Final Examinations	25%
TOTAL	100%

Methods of Computation

Absolute zero shall be used in all examinations and quizzes.

Percentile shall be used in recording grades when evaluating students using the formula below.

$$Final\ Grade = \frac{Midterm\ Grade + Final\ Term\ Grade}{2}$$

Grades Equivalent

<i>Rating</i>	<i>Grade</i>
96 - 100	1.00
91 - 95	1.25
86 - 90	1.50
81 - 85	1.75
76 - 80	2.00
71 - 75	2.25
66 - 70	2.50
61 - 65	2.75
60	3.00
Conditional	4.00
Below 60	5.00



CONDITIONAL is not a grade. It is given to students that lacks necessary requirements and therefore, must be accomplished before the end of that semester to obtain a grade. INCOMPLETE (INC) is reflected in the university online grading/report system as a mark given to the students for major compliance in the subjects which requires a Completion Form from the Registrar to be filled-up and accomplished within a year, otherwise noncompliance is a final grade of 5.0. WITHDRAW (W) is also reflected in the grading/report to indicate that the student withdraw or did not finish/complete the subject enrolled.

Course Outline

WEEK	TOPICS	LEARNING OUTCOMES	BLENDED (Synchronous/Asynchronous)	
			Learning Activities	Assessment Tasks
1-3	Online Course Orientation via GOOGLE Classroom/Meet-up. Discussion of the Online Platforms such Weebly, Google Classroom/Meet-up, Discussion about university VMGO, including course syllabus/contents, class policies and requirements on the online learning modalities	<ul style="list-style-type: none"> Familiarize with the university VMGO Familiarize with the course policies, course outline and coverage Familiarize with the basic features of the learning management using Weebly and Google Classroom 	<ul style="list-style-type: none"> Watch the online college orientation via RSU and CET Facebook Official Accounts Handouts and other supplemental reading materials will be uploaded in the website on a weekly basis. Download relevant course materials via Weebly and Google Classroom 	<ul style="list-style-type: none"> Submission of individual short Reaction Paper via Google Classroom's Open Forum link Deadline of submission is set in real time
	MODULE 1 BACKGROUND TO RESEARCH 1. Meaning & characteristics of Research 2. Types and Classification of Research 3. Qualities and Characteristics of the Researcher 4. Research Ethics and Intellectual Property	<ul style="list-style-type: none"> Understand the meaning and characteristics of Research Identify the different types and classification of Research Understand the importance of research ethics in the conduct of Research and how the intellectual property will be protected 	<ul style="list-style-type: none"> Online attendance via Google Classroom/Meet-up Participation during online meet-up and Forum Discussion via Google Classroom Relevant video presentation via Youtube channel Download relevant course and supplemental reading materials via Weebly and Google Classroom and 	<ul style="list-style-type: none"> Submission of Reaction Paper/Homework or Assignment as posted in Google Classroom. All assessment tasks are hand-written in a dedicated notebook of the student, unless it is specified to be typewritten
4-6	MODULE 2 RESEARCH PROCESS 1. Components of the Research Process 2. Research Problem, Objectives, Theoretical and Conceptual Research Frameworks	<ul style="list-style-type: none"> Identify the components of the research process Discuss the research problem and research objectives, including theoretical and conceptual research 	<ul style="list-style-type: none"> Online attendance via Google Classroom/Meet-up Participation during online meet-up and Forum Discussion via Google Classroom 	<ul style="list-style-type: none"> Submission of Homework or Assignment or exercises Online Quiz with real time submission via Google Classroom



	3. Coverage of the Undergraduate Thesis (Research Project)	<p>frameworks as part of the research design</p> <ul style="list-style-type: none"> Discuss the coverage or contents of the undergraduate research project 	<ul style="list-style-type: none"> Relevant video presentation via Youtube channel Download relevant course and supplemental reading materials via Weebly and Google Classroom 	<ul style="list-style-type: none"> All assessment tasks are hand-written in a dedicated notebook of the student, unless it is specified to be typewritten
7-8	<p>MODULE 3 REVIEW OF RELATED LITERATURE</p> <ol style="list-style-type: none"> Related Legal Bases Related Literature and Studies Citation and Referencing using the American Psychological Association (APA) style Plagiarism Software (PLAGSCAN) Review of Journal Articles 	<ul style="list-style-type: none"> Discuss on how to conduct a review of literature in relation to legal bases, related literature and studies. Understand the importance of proper citation and referencing in literature review Familiarize with the software used for plagiarism 	<ul style="list-style-type: none"> Online attendance via Google Classroom/Meet-up Participation during online meet-up and Forum Discussion via Google Classroom Relevant video presentation via Youtube channel Download relevant course and supplemental reading materials via Weebly, and Google Classroom 	<ul style="list-style-type: none"> Submission of Homework or Assignment as posted in Google Classroom. Deadline of submission is set in real time First draft submission – Chapter 2: Literature Review All assessment tasks are hand-written in a dedicated notebook of the student, unless it is specified to be typewritten Online Quiz with real time submission via Google Classroom Individual Submission of the research topics
9	MIDTERM EXAMINATION			
10-12	<p>MODULE 4 RESEARCH METHODOLOGY</p> <ol style="list-style-type: none"> Research Design Qualities of Good Research Instrument The Variables Sampling Designs 	<ul style="list-style-type: none"> Discuss what is research design, including the qualities of good research instrument To identify the different variables the sampling design used in the research project 	<ul style="list-style-type: none"> Online attendance via Google Classroom/Meet-up Participation during online meet-up and Forum Discussion via Google Classroom Relevant video presentation via Youtube channel Relevant case studies on environmental issues and problems Download relevant course and supplemental reading materials 	<ul style="list-style-type: none"> Submission of Homework or Assignment as posted in Google Classroom. Deadline of submission is set in real time All assessment tasks are hand-written in a dedicated notebook of the student, unless it is specified to be typewritten Individual Submission of final proposed research topics



			via Weebly and Google Classroom	
13-14	MODULE 5 STATISTICAL TOOLS AND TREATMENT 1. Statistical Analysis: T-test, Z-test, ANOVA, Regression 2. Hypothesis Testing 3. Data analysis and interpretation	<ul style="list-style-type: none"> To identify statistical tools and perform basic statistical data analysis and interpretations 	<ul style="list-style-type: none"> Online attendance via Google Classroom/Meet-up Participation during online meet-up and Forum Discussion via Google Classroom Relevant video presentation via Youtube channel Download relevant course and supplemental reading materials via Weebly and Google Classroom 	<ul style="list-style-type: none"> Submission of Homework or Assignment as posted in Google Classroom. Deadline of submission is set in real time All assessment tasks are hand-written in a dedicated notebook of the student, unless it is specified to be typewritten Submission of the written report of the Final Group Work Preliminary group work discussion and tasking among groups
15-17	RESEARCH PROPOSAL/THESIS WRITING	<ul style="list-style-type: none"> To apply the knowledge gained from the previous discussions (Modules 1-5) 	<ul style="list-style-type: none"> Online attendance via Google Classroom/Meet-up Participation during online meet-up and Forum Discussion Distribution and discussion of the plagiarism report (Plagscan) 	<ul style="list-style-type: none"> Submission of the written report of the Individual and Final Group Works Oral Presentation
18	FINAL EXAMINATION			

References:

Dawson, C. (2009). *Introduction to Research Methods, A Practical Guide for Anyone Undertaking a Research Project*, 4th Edition, UK: How to Content. Retrieved from <https://www.pdfdrive.com/introduction-to-research-methods-a-practical-guide-for-anyone-undertaking-a-research-project-e157725135.html>

Vanderstoep, S. & Johnston, D. (2009). *Research Methods for Everyday Life: Blending Qualitative and Quantitative Approaches*, USA: Jossey-Bass. Retrieved from <https://www.pdfdrive.com/research-methods-for-everyday-life-blending-qualitative-and-quantitative-approaches-research-methods-for-the-social-sciences-e161070302.html>



Neuman, W. (2014). *Social Research Methods: Qualitative and Quantitative Approaches*, 7th Edition, UK: Pearson Education Limited. Retrieved from <https://www.pdfdrive.com/social-research-methods-qualitative-and-quantitative-approaches-e19744746.html>

Johnson, R. & Christensen, L (2014). *Educational Research: Quantitative, Qualitative, and Mixed Approaches*, USA: SAGE Publications, Inc. Retrieved from <https://ismailsunny.files.wordpress.com/2017/07/educational-research-quantitative-r-robert-burke-johnson.pdf>

ADDITIONAL READING MATERIALS

Albert, J R (2008). *Basic Statistics for the Tertiary Level*, Padua, Patungan & Arquez (eds), Manila: Rex Book Store.

Asaad, A S (2008). *Statistics Made Simple for Researchers*, Manila: Rex Book Store.

Castillo, Fely S. (2007). *Research Education and Scientific Writing*, Latest Edition, Manila: Booklore Publishing Corporation.

Finkelsten, Leo Jr (2005). *Pocket Book of Technical Writing for Engineers and Scientists*, 2nd Edition, McGraw-Hill (Asia)

Fraenkel, Kack R., Wallen, Norman E., and Hyun, Helen H. (2013). *How to Design and Evaluate Research in Education*, 8th Edition, New York: McGraw-Hill International Edition.

Frankfort- Nachmias, Chava, and Nachmias, David (1997). *Research Methods in the Social Sciences*, 5th Edition, Arnold, London.

Fraenkel, Kack R., and Wallen, Norman E. (2010). *How to Design and Evaluate Research in Education*, 7th Edition, New York: McGraw-Hill International Edition.

Jha, A S (2011). *Research Methodology*, Delhi: APH Publishing Corporation.

Mustafa, A (2010). *Research Methodology*, India: AITBS Publishers.

Paler-Calmorin & L, Calmorin, M A (2007). *Research Methods and Thesis Writing*, 2nd edition, Manila: Rex Book Store.

Sanchez, C A (1997). *Methods Techniques of Research*, 3rd Edition, Manila: Rex Book Store.

NOTE: All handouts and supplemental reading materials are available at the following sites:

www.rsucivilengineering.weebly.com

www.braininitativesph.com

Google Classroom Link: <https://classroom.google.com/c/NTM4NTY1MzAxMjE4?cjc=isa6cpx>

Class code: **isa6cpx**

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