Graduate Attribute Rubrics

Faculty of MCA

Maharaja Institute of Technology Mysore

Belawadi, Naguvanahalli Post, Srirangapatna Taluk, Mandya-571477

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(Approved by AICTE, Affiliated by VTU, Belgavi and Recognized by Govt. of Karnataka)

FOREWORD

Rubrics are used for communicating the performance expectations for any activity. They are ways to provide transparent criteria for assessment for all stakeholders (faculty, instructors, students, alumni and Industry). Rubrics are descriptive, and thereby can be used as a tool to promote understanding, and to direct future instruction and learning. They can as well be used for self and peer evaluation.

The primary aims of rubrics are to, Define foci and/or indicators for each graduate attribute; Divide each indicator into four performance levels; Target the level that indicates student competency.

Rubrics are a tool conducive to outcomes-based education and assessment, a guiding principle for NBA accreditation. The Faculty of MCA Graduate Attribute Rubrics can be used to facilitate a common understanding and language for engineering stakeholders (faculty, instructors, students, alumni and Industry) regarding the ten NBA graduate attributes. They are intended as a pedagogical assessment tool for use by instructors of individual courses, as well as for assessment at the program level, as applicable.

I congratulate the team of faculty for having penned down 'The Faculty of MCA Graduate Attribute Rubrics' and urge all concerned to make best possible use of it to ensure continuous improvement in all sphere of academics.

Dr. Naresh Kumar B G
Principal

ACKNOWLEDGEMENTS

PO1: Computational Knowledge: Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer based systems.

Focus Areas	Indicators	Level 4	Level 3	Level 2	Level 1
		Strong	Competent	Developing	Needs Work
Knowledge Base	**Mathematical and Scientific Terms:** Interpret and apply scientific and mathematical terms.	Demonstrates a skilful ability to interpret mathematical and scientific terms correctly.	Demonstrates an ability to interpret most mathematical and scientific terms correctly.	Demonstrates some ability to interpret mathematical and scientific terms correctly.	Demonstrates minimal or no ability to interpret mathematical and scientific terms correctly.
	Theory in Engineering Problems: Ability to interpret and apply theory in engineering problems.	Demonstrates a comprehensive Understanding of underlying theory and application to the problem.	Demonstrates an ability to Understand the application of theory to the problem.	Demonstrates some ability to Understand the application of theory to the problem.	Demonstrates minimal or no ability to Understand the application of theory to the problem.
	Mathematical Models: Ability to apply mathematical models to engineering problem and/or formulate engineering models.	Chooses an optimal mathematical model that applies to an engineering problem, and develops new models.	Chooses a mathematical model that applies to an engineering problem, and has some success in model development.	Chooses a mathematical model that applies to an engineering problem, but requires assistance in model development.	Demonstrates minimal or no Understanding of the connection between mathematical models and engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					
Focus Areas	**Indicators**	**Level 4** **Strong**	**Level 3** **Competent**	**Level 2** **Developing**	**Level 1** **Needs Work**
Problem Solving	**Identify/Define and Contextualize Problem:** Ability to identify and/or articulate a problem.	Demonstrates a skilful ability to identify/articulate a problem that is strongly supported and clearly linked to the issues at hand and demonstrates a comprehensive and insightful understanding	Demonstrates ability to identify/articulate a problem that is clearly linked to the issues at hand.	Demonstrates some ability to identify / articulate a problem that is partially connected to the issues at hand.	Demonstrates minimal or no ability to identify/articulate a problem.
	Formulate Strategies for Solving a Problem: Ability to identify strategies for solving problems (brainstorming, research, trial and error).	Demonstrates a skilful ability to identify multiple strategies for generating approaches to solve a problem, and has insight into the pros and cons of those strategies.	Demonstrates an ability to identify an appropriate strategy for generating approaches for solving a problem.	Demonstrates some ability to identify a strategy for generating an approach for solving the problem. Strategy may or may not be appropriate.	Demonstrates minimal or no ability to identify a strategy for generating an approach for solving a problem.
	Analyze, Evaluate and Select Solutions: Ability to analyze, evaluate and select optimal/practical Solution, including feasibility and impact.	Demonstrates a skilful ability to analysis, evaluate and select optimal/practical solution, thorough and insightful explanation of feasibility and impact.	Demonstrates an ability to analyze, evaluate and select optimal/practical solution. Clear explanation of feasibility and impact.	Demonstrates some ability to analyze, evaluate and select optimal/practical solution. Partial explanation of feasibility and impact.	Demonstrates minimal or no ability to analyze, evaluate or select optimal/practical solution. No explanation of feasibility and impact.

PO 3: Design/Development of Solutions: Design computing system to meet desired needs within realistic constraints such as safety, security and applicability.

Focus Areas	Indicators	Level 4 Strong	Level 3 Competent	Level 2 Developing	Level 1 Needs Work
Design Process	**Understanding the Design Process:** Ability to explain the design process including the importance of needs, specifications, concept generation, selection and evaluation.	Demonstrates a comprehensive ability to understand and explain a design process.	Demonstrates an ability to understand and explain a design process.	Demonstrates some ability to understand and explain a design process.	Demonstrates minimal or no ability to understand and explain a design process.
	Problem Solving: Considering Solutions: *Ability to develop an approach to solve a problem.*	Considers multiple approaches to solving a problem, and develops a logical, consistent plan. Recognizes consequences of solution and can articulate reason for choosing solution.	Considers multiple approaches to solving a problem, which is justified and considers consequences.	Considers a few approaches to solving a problem; doesn't always consider consequences.	Considers a single approach to solving a problem. Does not consider consequences.
	Implementing Design Strategy: *Ability to execute a solution to an open-ended problem taking into consideration design requirements and pertinent contextual elements.*	Demonstrates a skilful (thorough/insightful/creative) ability to execute a solution taking into consideration all design requirements and pertinent contextual elements.	Demonstrates an ability to execute a solution taking into consideration design requirements and some contextual elements.	Demonstrates some ability to execute a solution that attends to the problem, but omits some design requirements and/or pertinent contextual elements.	Demonstrates minimal or no ability to execute a solution. Solution does not directly attend to the problem.
Creative Thinking	***Innovation:***	Demonstrates a	Demonstrates an ability	Demonstrates some	Demonstrates minimal

Ability to recognize and incorporate innovation when considering an idea.	comprehensive recognition and incorporation of innovation when considering an idea.	to recognize and incorporate innovation when considering an idea.	recognition and incorporation of innovation when considering an idea.	or no recognition of innovation when considering an idea.
Connecting and Integrating: *Ability to connect, integrate and transform ideas into solutions.*	Demonstrates a skilful ability to connect, integrate and transform innovative ideas into innovative solutions.	Demonstrates an ability to connect, integrate and transform ideas into solutions.	Demonstrates some ability to connect, integrate and transform ideas into solutions.	Demonstrates minimal or no ability to connect, integrate and transform ideas into solutions.

PO 4: Conduct Investigations of Complex Computing Problems: Devise and conduct experiments, interpret data and provide well informed conclusions.

Focus Areas	Indicators	Level 4 Strong	Level 3 Competent	Level 2 Developing	Level 1 Needs Work
Experimental /Theoretical Methods	***Lab Preparation:*** *Ability to gather materials and record on lab report.*	Exemplary materials are gathered and recorded on the lab report with clarity and concision.	All required materials are gathered and recorded on the lab report. The selected materials are suitable for the procedure.	Most required materials are gathered; not all may be recorded on the lab report. The selected materials are adequate for the procedure.	All required materials are not gathered, nor recorded on the lab report. The selected materials are not all adequate and/or suitable for the procedure.
	Purpose: *Ability to state the hypothesis and the research question, clarify the connection between them, and identify the variables.*	The hypothesis and research question are skilfully specified, and the connection between the two is explained in depth. The variables are identified and discussed.	The hypothesis and research question are specified clearly, and the connection between the two is explained. The variables are identified.	The hypothesis and research question are specified, and the connection between the two is somewhat clear. Most variables are identified.	The hypothesis and research question are not specified clearly, and the connection between the two is vague or missing. Most variables are not identified.
	Procedure: *Ability to follow experimental procedures, control variables, and record procedural steps on lab report.*	The procedure is efficiently followed and student skilfully controls all chosen variables. All procedural steps are clearly and concisely recorded on lab report.	The procedure is well followed and student demonstrates control of all chosen variables. All procedural steps are recorded on the lab report.	The procedure could be better followed, but student controls all chosen variables. Most procedural steps are recorded on the lab report.	The procedure is inadequately followed, and student does not control chosen variables. Many procedural steps are not entered on the lab report.
	Data/Evidence	Raw data/evidence, as	Raw data/evidence, as	Raw data/evidence, as	Raw data/evidence, as

	Collection: Ability to record raw data/evidence.	well as units, are skilfully recorded. The data table is clearly and concisely, and/or creatively labelled and formatted.	well as units, are appropriately and clearly recorded. The data table is appropriately labelled and formatted.	well as units, are recorded although not as clearly or suitably as they might be. The data table may lack appropriate labels and/or format.	well as units, are not recorded suitably. The data table is not labelled and/or formatted.
	Data Presentation and Error Analysis: *Ability to present data using charts, tables and/or graphs to enable comprehension and interpretation, including erroranalysis.*	Data are presented in ways to best enable comprehension and interpretation, skilfully incorporating error analysis.	Data are presented in ways to enable comprehension and interpretation, incorporating error analysis.	Data are presented in ways that somewhat aid comprehension and interpretation and incorporate error analysis, but presentation could be clearer.	Data are not presented clearly. Error analysis is wrong or missing.
	Evaluation of Experiment: Ability to interpret findings, compare them to values in the literature, identify weaknesses and limitations, and propose improvements.	The findings are interpreted insightfully and skilfully compared with values in the literature. Weaknesses and limitations are analyzed and creative recommendations are made to address them.	The findings are interpreted and compared with values in the literature. Weaknesses and limitations are considered and recommendations are made to address them.	The findings are interpreted and compared with values in the literature, but not as fully or clearly as they might be. Not all of the weaknesses or limitations are discussed; few recommendations are made to address them.	The interpretation of the findings is illogical, and the findings are not compared with values in the literature. Few or no weaknesses or limitations are discussed; few or no recommendations are made to address them.

PO 5: Modern Tool Usage: Use selected modern computing tools and techniques with dexterity.					
Focus Areas	**Indicators**	**Level 4** **Strong**	**Level 3** **Competent**	**Level 2** **Developing**	**Level 1** **Needs Work**
Use of Engineering Tools	***Understand Tools:*** *Ability to describe and explain the principles behind and applicability of engineering tools.*	Demonstrates skilful ability to describe and explain the principles behind and applicability of engineering tools.	Demonstrates ability to describe and explain the principles behind and applicability of engineering tools.	Demonstrates some ability to describe and/or explain the principles behind and applicability of engineering tools.	Demonstrates minimal or no ability to describe and/or explain the principles behind and applicability of engineering tools.
	Identify and Use Tools: *Ability to identify and use relevant tools for an engineering activity.*	Demonstrates skilful ability to identify and use the most relevant tools for a range of engineering activities.	Demonstrates an ability to identify and use relevant tools for an engineering activity.	Demonstrates some ability to identify and use tools for an engineering activity, but may not identify the most relevant tool.	Demonstrates minimal or no ability to identify or use tools for an engineering activity.
	Evaluate Tools: *Ability to identify the limitations in the use of engineering tools, and their underlying assumptions.*	Demonstrates skilful ability to evaluate the limitations of tools and discusses the assumptions.	Demonstrates the ability to identify the limitations of tools and understands the assumptions.	Demonstrates some ability to identify the limitations of tools and some understanding of the assumptions.	Demonstrates minimal or no ability to identify the limitations of tools and understand the assumptions.

PO 6: Professional Ethics: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

Focus Areas	Indicators	Level 4 Strong	Level 3 Competent	Level 2 Developing	Level 1 Needs Work
Ethics	*Ethical Issue Recognition and Behaviour: Ability to recognize and act on ethical issues (personal, professional and corporate).*	Approaches all situations with awareness and consideration of the ethical issues involved, and actively work to resolve them.	Able to approach situations with consideration of ethical issues, and acts to resolve them.	Some ability to approach situations with consideration of ethical issues, and/or some ability to act to resolve them.	Minimal or no ability to approach situations with consideration of ethical issues.
	Equity: Ability to recognize equitable issues (ethnicity, gender, age, sexual orientation, faith, geography, socio-economic status, etc.), and acts/behaves with inclusivity.	Approaches all situations with consideration of equitable issues involved, and actively behave with inclusivity.	Able to approach situations with consideration of equitable issues, and acts with inclusivity.	Some ability to approach situations with consideration of equitable issues, and behaves with some regard for inclusivity.	Minimal or no ability to approach situations with consideration of equitable issues.
	Accountability: Recognizes the need to assume responsibility for own actions.	Always assumes responsibility for own actions.	Assumes responsibility for own actions.	Recognizes the need to assume responsibility for own actions, but may not always act on this recognition.	Minimal or no ability to recognize the need to assume responsibility for own actions. May blame others for own issues and problems.

Proper Use of Others' Work: *Ability to recognize, understand and apply* proper *ethical use of intellectual property, copyrighted materials, and research.*	Always recognizes and applies proper ethical use of intellectual property, copyrighted materials, and others' research.	Recognizes and applies proper ethical use of intellectual property, copyrighted materials, and others' research.	Some recognition and application of proper ethical use of intellectual property, copyrighted materials, and others' research.	Minimal or no recognition and/or application of proper ethical use of intellectual property, copyrighted materials, or others' research.

PO 7: Life-long Learning: Recognize the need for life-long learning with an ability to appreciate the importance of goal setting.

Focus Areas	Indicators	Level 4 Strong	Level 3 Competent	Level 2 Developing	Level 1 Needs Work
Life Long Learning	***Interest and Curiosity:*** *Inclination/ability to explore a subject/topic in the pursuit of knowledge.*	Demonstrates a skilful ability to explore a subject/topic thoroughly, generating a variety of knowledge, possibly specialized or obscure, demonstrating deep fascination and curiosity.	Demonstrates an ability to explore a subject/topic, generating a variety of knowledge, demonstrating fascination and curiosity.	Demonstrates some ability to explore a subject/topic, providing some knowledge, demonstrating mild interest and growing curiosity.	Demonstrates minimal or no ability to explore a subject/topic, demonstrating minimal interest or curiosity.
	Initiative: *Inclination/ability to explore additional opportunities for learning.*	Creates and seeks additional opportunities for learning.	Finds and pursues additional opportunities for learning.	Some inclination to explore additional opportunities for learning.	Minimal or no inclination to identify additional opportunities for learning.
	Adaptability to New Situations: *Ability to apply prior knowledge, skills and/or behaviours to new situations.*	Demonstrates a skilful ability to apply prior knowledge, skills and/or behaviours in an innovative way to new situations.	Demonstrates an ability to apply prior knowledge, skills and/or behaviours to new situations.	Demonstrates some ability to apply prior knowledge, skills and/or behaviours to new situations.	Demonstrates minimal or no ability to apply prior knowledge, skills and/or behaviours to new situations.
	Staying Current: *Engaged in staying current in the chosen*	Demonstrates an active and thorough engagement, and	Demonstrates engagement in staying current in the chosen	Demonstrates some engagement in staying current in the chosen	Demonstrates minimal or no awareness or appreciation for staying

field.	promotes staying current and immersed in the chosen field.	field.	field.	current in the chosen field.
Asking Questions: *Ability to recognize and/or construct meaningful and pertinent questions.*	Demonstrates a skilful ability to recognize and construct meaningful and pertinent questions.	Demonstrates an ability to recognize and construct meaningful and/or pertinent questions.	Demonstrates some ability to recognize and/or construct meaningful or pertinent questions.	Demonstrates minimal or no ability to recognize or construct meaningful or pertinent questions. May not be inclined to ask questions.
Handling Constructive Criticism: *Ability to accept and use constructive feedback (desists from quarrelling; considers others' points of view; shows appreciation for feedback; implements change).*	Demonstrates a skilful ability to seek, accept and use constructive feedback.	Demonstrates an ability to accept and use constructive feedback.	Demonstrates some ability to accept and/or use constructive feedback.	Demonstrates minimal or no ability to accept and use constructive feedback.
Reflection (Lessons Learned): *Ability to reflect on (analyze and evaluate) experiences/situations, and apply results from*	Reflect with depth and insight on experiences/situations. Skilfully applies what is learned from reflections to subsequent	Demonstrates an ability to reflect on experiences/situations. Demonstrates learning through reflection.	Demonstrates some ability to reflect on experiences/situations. Demonstrates some learning through reflection.	Demonstrates minimal or no ability to reflect on experiences/situations. Tends to repeat mistakes.

	reflections to subsequent experiences/situations. (Learns from successes and mistakes, and recognizes limitations.)	experiences/situations.			
Research/ Information Literacy	***Formulate a Topic /Define Research Scope:*** *Ability to frame a topic, determine research scope, identify essential concepts and define research questions.*	Demonstrates the ability to succinctly articulate a topic. Clearly and concisely determines the research scope, identifies essential concepts and outlines research questions.	Demonstrates the ability to articulate a topic. Determines the research scope, identifies key concepts and drafts research questions.	Demonstrates some ability to articulate a topic, but the research scope is either too expansive or too limited. Can identify some key concepts and draft some research questions. Work needs refining.	Demonstrates minimal or no ability to articulate a topic. Difficulty determining the research scope, identifying key concepts and/or drafting research questions.
	Execute a Search Strategy and Retrieve Needed Information: *Ability to use search strategies and access information.*	Demonstrates the ability to use efficient and effectively-designed search strategies to retrieve the most relevant and appropriate information sources. Effectively and recurrently refines search.	Demonstrates the ability to use an assortment of search strategies to retrieve relevant and appropriate information sources. Refines search as needed.	Demonstrates the ability to use search strategies to retrieve some information sources, but strategies are mainly simplistic and limited, and search scope too broad for task at hand. (Does not use controlled vocabularies.)	Demonstrates minimal or no ability to formulate simple searches effectively. Performs very basic keyword searches (single words and/or simple phrases), which retrieve unacceptably large numbers of hits.

			Information is found within a narrow range of sources.	Information is selected randomly, with little or no applicability or value.
Select and Evaluate Information and Sources Critically: *Ability to use criteria to select and evaluate sources and information.*	Selects a variety of sources which thoroughly covers the range of research and directly relates to concepts or answers research questions. Able to skilfully analyze information sources based on reliability, validity, accuracy, authority, purpose, currency, relevance, partiality and audience. Sources are balanced and mostly authoritative.	Selects variety of sources which covers the range of research and relates to concepts or answers research questions. Demonstrates ability to distinguish between relevant and irrelevant information. Usually selects sources using multiple criteria, such as reliability, validity, accuracy, authority, purpose, currency, and relevance. Sources not always balanced.	Selects some relevant sources, but includes irrelevant sources. Chosen information is somewhat connected to research concepts or questions. Rarely evaluates information for reliability, validity, accuracy, authority, purpose, currency or relevance. Many sources are not authoritative, neither is there a variety or balance of sources.	Selects few sources with little breadth, i.e., many sources are from the same journal or web site, or from non- referred articles and/or very general web sites. Chosen information is not connected to research concepts or questions. Selects sources using limited criteria, such as reliability, validity, accuracy, authority, purpose, currency or relevance.

PO 8: Communication Efficacy: Communicate effectively on complex problems with the associated audience through effective documentation, presentations, and give and receive clear instructions.

Focus Areas	Indicators	Level 4 Strong	Level 3 Competent	Level 2 Developing	Level 1 Needs Work
Technical Communication Skills	*Purpose:* *Ability to identify the reason for the communication, chooses the best communication for the task, and use the purpose to guide the communication.*	Purpose is clear and effectively guides the communication. Choice of communication is optimal.	Purpose is evident, and mostly guides the communication. Choice of communication is effective.	Purpose is somewhat clear and somewhat guides the communication. Choice of communication is somewhat effective.	Purpose is unclear. Does not guide the communication. Choice of communication is ineffective.
	Main Idea: *Ability to communicate the main idea.*	Main idea is clearly and precisely stated.	Main idea is understandable.	Main idea is somewhat understandable.	Main idea is difficult to understand.
	Supporting Materials: Ability to use information sources (texts, journals, research) and/or generate materials (examples, statistics, analogies) to support the purpose and main idea, and establish	Demonstrates skilful use of superior, trustworthy, pertinent and compelling materials that support the purpose and main idea.	Demonstrates consistent use of trustworthy, appropriate and pertinent materials that support the purpose and main idea.	Demonstrates an attempt to use trustworthy, appropriate and pertinent materials that support and develop the purpose and main idea.	Demonstrates minimal or no attempt to use trustworthy, appropriate and pertinent materials to support the purpose and/or main idea.

credibility.				
Organization: *Ability to structure ideas to move logically forward.* *E.g., For written communication both macro (introduction, paragraphs, sequence of content, conclusion) and micro organization (sentences, transitions) are considered.*	Materials are seamlessly arranged in a logical sequence and both macro and micro elements enhance the work and the reader's comprehension.	Material moves logically forward, and both macro and micro elements are clear, coherent, and easy to follow.	Material has some logical order and is somewhat coherent or easy to follow.	Material has little logical order, and is often unclear, incoherent and difficult to follow.
Clarity and Conciseness: *Ability to use language that clearly and concisely conveys meaning and supports the purpose of the work.*	Uses language that conveys meaning with clarity and parsimony, and enhances the purpose of the work.	Uses language that clearly and concisely conveys meaning, and supports the purpose of the work.	Uses language that generally conveys meaning, is somewhat concise, and supports the purpose of the work.	Uses language that may be unclear and/or in concise, may sometimes impede meaning, and minimally supports the purpose of the work.
Mechanics: *Ability to use language that is mechanically corrects (punctuation, spelling, grammar).*	Communication contains very few or no errors.	Communication contains some errors, but errors do not detract from meaning.	Communication contains errors. Errors may be distracting.	Communication contains many errors. Errors impede meaning.
Genre and	Demonstrates	Demonstrates	Demonstrates some	Demonstrates minimal

	Conventions: Ability to understand and use conventions intrinsic to engineering genres (formal/informal reports, lab reports, final completion reports, proposals, presentations).	thorough/sophisticated understanding of and skilful use of the conventions inherent within the engineering genre.	understanding of and use of the conventions inherent within the engineering genre.	understanding of and attempts to use the conventions inherent within the engineering genre.	or no understanding of or effort to use the conventions inherent within the engineering genre.
Visuals for Written Communication	***Illustrations (Graphs, Tables, Figures and Diagrams):** Ability to use illustrations properly to support ideas (citations, position on page, integration, design and support of ideas).*	Illustrations are skilfully used to support ideas (correctly cited, skilfully positioned on page, well integrated and designed; they enhance points, explain, interpret, and assess information).	Illustrations are properly used to support ideas (correctly cited, positioned on page, integrated and designed; they support, explain and interpret information).	Illustrations are for the most part properly used to support ideas (an attempt is made to correctly cite, position on page, integrate, and/or design, and to support, explain or interpret information).	Illustrations are used, but minimally support ideas, and are not properly cited, positioned on page, integrated and/or designed. They do not support, explain or interpret information.
	Formatting/Layout/Design of Communication: *Ability to use appropriate or prescribed format, which is effectively designed, clearly labelled, neatly and professionally*	The appropriate/*prescribed* format is precisely followed. Design is exemplary. Headings are clear and add to the overall meaning of, and/or enhance the	The appropriate/ *prescribed* format is followed. Design is effective; headings are clear, and work is neatly and professionally presented. Format	The appropriate/ *prescribed* format is followed in most portions of the communication. Design is somewhat effective; headings are somewhat clear, and work is for	The appropriate/ *prescribed* format is not followed. Design of communication is ineffective; headings are unclear, and work is not neatly presented. Format does not invite

	presented.	communication. Work is exceptionally neat and professionally presented. Format compels reading.	invites reading.	the most part, neatly presented.	reading.
General Communication Skills	***Active Listening:*** *Ability to pay attention to a speaker, summarize key ideas and supporting information.*	Demonstrates skilful ability to actively listen by rephrasing/repeating all of the speaker's key ideas and supporting information.	Demonstrates ability to actively listen by rephrasing/repeating most of the speaker's key ideas and supporting information.	Demonstrates some ability to actively listen by rephrasing/repeating some of the speaker's key ideas and supporting information.	Demonstrates minimal or no ability to actively listen to the speaker. Is unable to rephrase/repeat key ideas and/or supporting information. May be distracting to others.
	Following Instructions: *Ability to follow instructions (spoken and/ or written).*	Is able to concisely and effectively follow spoken and/or written instructions.	Is able to follow spoken and/or written instructions.	Is partially able to follow spoken and/or written instructions.	Is unable to follow spoken and/or written instructions.
	Giving/Writing Instructions: *Ability to give/write clear directions or instructions, convey the sequence of steps and use clear examples/references.*	Gives/writes clear and concise directions or instructions. Skilfully conveys the sequence of steps and uses model examples/references. Listener/reader easily and smoothly follows instructions.	Gives/writes clear directions or instructions. Conveys the sequence of steps and uses clear examples/references. Listener/reader can follow the instructions.	Gives/writes somewhat clear directions or instructions. Generally conveys the sequence of steps; uses some examples/references. Listener/reader can for the most part follow the instructions.	Gives/writes unclear directions or instructions. For the most part does not convey the sequence of steps. Uses few or no examples/references. Listener/reader has difficulty following the instructions.

	Asking Questions: *Ability to recognize and/or construct meaningful and relevant questions.*	Demonstrates a skilful ability to recognize and construct meaningful and relevant questions.	Demonstrates an ability to recognize and construct meaningful and/or relevant questions.	Demonstrates some ability to recognize and/or construct meaningful or relevant questions.	Demonstrates minimal or no ability to recognize or construct meaningful or relevant questions. May not be inclined to ask questions.
Communication Skills for Oral Reports	**Key Ideas: Organization and Articulation** *Ability to present strong key ideas and supporting details with clarity and concision (logical sequencing, clear transitions between points, introduction, supporting details and summary).*	Presentation logically and skilfully structured. Key ideas are compelling, and articulated with exceptional clarity and concision. Introduction, supporting details and summary are clearly evident and memorable, and ascertain the credibility of the speaker.	Presentation has clear structure and is easy to follow. Key ideas are clearly and concisely articulated, and are interesting. There is sufficient detail to ascertain speaker's authority, and presentation includes an introduction and summary.	Presentation has some structure. Key ideas generally identifiable, although not very remarkable. Introduction, supporting details and/or summary may be too broad, too detailed or missing. Credibility of the speaker may be questionable at times.	Presentation rambles. Not organized; key ideas are difficult to identify, and are unremarkable. No clear introduction, supporting details and summary. Speaker has no credibility.
	Tailoring Communication: *Ability to use language that is appropriate for:* *(i) the target audience;* *(ii) The company/persons that the communicator is representing.*	Communication is skilfully crafted to suit level of target audience and is appropriate for company/persons represented.	Communicator takes into consideration the target audience and company/persons represented. Communication contains details and/or technical content that	Communicator takes some consideration of the target audience and company/persons represented. Communication may still contain some detail or technical content that are	Communicator takes minimal or no consideration of the target audience or company/persons represented. Communication may contain details or

			are suitable for level of target audience.	unsuitable for level of target audience.	technical content that are unsuitable for level of target audience.
Time Management: *Ability to complete presentation in the time allocated.*		Presentation fits perfectly within time constraint.	Presentation fits within time constraint, though presenter might have to subtly rush or slow down.	Presentation does not quite fit within time constraint; presenter has to rush or slow down at end.	Presentation is unsuitably short or unreasonably long.
Delivery (verbal): *Ability to use diction, enunciation, volume, pacing to effectively deliver the presentation.*		Delivery makes the presentation compelling.	Delivery makes the presentation interesting.	Delivery makes the presentation understandable.	Delivery detracts from the presentation.
Delivery (non-verbal): Evidence of Preparation: *Ability of presenter to:* • Speak easily with few aids (note cards/slides) • Control posture and gestures • Position oneself in relation to audience, podium and slides • Control distractions (nervous habits, stall words)		Excellent delivery: • Sustained and comfortable eye contact • Can be clearly heard • Speaks confidently with few aids • Does not block screen • No distracting, nervous habits • Speaker is polished	Good delivery: • Makes eye contact • Can be heard easily • Speaks comfortably with some aids • Does not block screen • No distracting nervous habits • Speaker appears comfortable	Has minor difficulties with non-verbal delivery of presentation: • Effort to maintain eye contact • At times difficult to hear or understand • May overuse/underuse aids • At times hesitates, makes mistakes, or loses place; presentation seems memorized • At times blocks screen • Displays nervous habits (pauses, tapping, "um-ing" etc.) • Speaker appears	Major difficulties with the non-verbal delivery of the presentation. • Sporadic or no eye contact • Hard to understand or hear • Uses aids excessively or not at all • Reads from paper • Stands in front of screen • Nervous habits are distracting (pauses, tapping, "um-ing" etc.)

Audience Rapport: Ability of presenter to: • Sustain eye contact • Scan audience			tentative	• Speaker appears uncomfortable.
Visual Aids: *Ability to design, use and integrate visual aids (slides, illustrations, props, demonstrations) that effectively support and focus the presentation.*	Visual aids are skilfully/creatively designed, skilfully used and seamlessly integrated into the presentation. The presentation looks polished and professional.	Visual aids are well designed, used and integrated into the presentation. The presentation looks professional.	Visual aids are somewhat well designed, used and integrated into the presentation. The presentation looks somewhat professional.	Visual aids poorly designed (difficult to read; poor level of detail; missing captions or labels; misspelled words), and poorly used/overused. The presentation looks unprofessional.
Appearance/Attire of Presenter: *Ability to adopt an appearance/attire that is appropriate to the presentation.*	Professional appearance /attire that is well suited for presentation.	Appearance/attire is appropriate for presentation.	Appearance/attire is not quite appropriate for the presentation.	Little or no consideration of appearance/attire taken.
Q & A with Audience: *Ability to transition from presentation, listen to, answer and manage questions from the audience.*	Seamless transition from presentation to Q & A. Skilfully manages and responds to questions; gauges questioners' understanding; is able to clarify answers for diverse audiences and objectives.	Smooth transition from presentation to Q & A. Listens carefully and responds courteously, knowledgeably and clearly to questions.	Some ability to transition from presentation to Q & A. Understands most questions, responds somewhat knowledgeably and/or somewhat succinctly.	Minimal or abrupt transition from presentation. May not actively listen to questions, or provide knowledgeable answers, and/or may be unable to answer questions succinctly.

PO 9: Societal and Environmental Concern: Understand the impact of system solutions in a contemporary, global, economical, environmental, and societal context for sustainable development.

Focus Areas	Indicators	Level 4 Strong	Level 3 Competent	Level 2 Developing	Level 1 Needs Work
Impact of Engineering on Society and the Environment	***Solutions for Societal and Environmental Challenges:*** *Ability to identify solutions to challenges in society and the environment.*	Identifies, explains and evaluates multiple solutions to challenges in society and the environment.	Identifies and explains multiple solutions to challenges in society and the environment.	Identifies some solutions to challenges in society and the environment.	Minimal or no ability to identifying solutions to challenges in society and the environment.
	Personal and Collective Responsibility: *Ability to recognize the individual and collective responsibility of engineering and its interventions on society and the environment.*	Recognizes the responsibility of engineers and evaluates the consequences of engineering interventions on society and environment.	Recognizes the responsibility of engineers and identifies the consequences of engineering interventions on society and environment.	Some recognition of the responsibility of engineers and the consequences of engineering interventions on society and environment.	Minimal or no recognition of the responsibility of engineers and the consequences of engineering interventions on society and environment.

PO 10: Individual and Team Work: Execute the project either individually or in a group exhibiting skills to achieve productive goals.					
Focus Areas	**Indicators**	**Level 4**	**Level 3**	**Level 2**	**Level 1**
		Strong	**Competent**	**Developing**	**Needs Work**
Individual Contributions Within a Team	***Individual Idea Contributions:*** *Ability to contribute useful ideas to advance work of team.*	Routinely contributes useful ideas to advance the work of team.	Contributes useful ideas to advance the work of the team.	Sometimes contributes useful ideas to advance work of team.	Rarely contributes useful ideas to advance the work of the team.
	Individual Work Contributions: *Ability to carry out individual responsibilities.*	Designated jobs are accomplished by deadline; completed work is carefully and meticulously prepared and meets all requirements.	Designated jobs are accomplished by deadline; completed work meets requirements.	Designated jobs are accomplished by deadline; completed work meets most requirements.	Some designated jobs are accomplished by deadline; completed work meets some requirements.
	Individual Preparation and/or Contribution to Team Meetings: *Ability to prepare and/or to contribute to team meetings.*	Thoroughly and carefully prepared for team meetings. Contributes by sharing information and knowledge.	Prepared for team meetings. Provides contributions.	Usually prepared for team meetings. Provides some contributions.	Routinely fails to prepare for team meetings. Provides little or no contributions.
	Time Management: *Ability to manage time (estimate, prioritize, establish deadlines/*	Demonstrates the ability to manage time, including communicating and/or	Demonstrates the ability to manage time, including communicating and/or	Demonstrates some ability to manage time.	Demonstrates minimal or no ability to manage time.

	milestones, follow timeline, plan for contingencies, adapt to change).	reacting and adapting to changes.	reacting to changes.		
	Credit and Accountability: *Ability to share credit and accept accountability when working in a team.*	Shares credit and always accepts accountability.	Shares credit and accepts accountability.	Sometimes shares credit and accepts accountability.	Has difficulty or does not share credit or accept accountability.
Team Skills	***Leadership Skills:*** *Ability to lead a team. (i) Mentors and accepts mentoring from others. (ii) Demonstrates capacity for initiative while respecting others' roles. (iii) Facilitates others' Involvement. (iv) Evaluates team effectiveness and plans for improvements.*	Exemplifies leadership skills.	Demonstrates leadership skills.	Demonstrates some leadership skills at times.	Demonstrates minimal or no leadership skills.
	Working with Others: *Ability to listen to,*	Skilfully listens to, collaborates with, and	Listens to, collaborates with, and champions	Sometimes listens to, collaborates with, and	Rarely listens to, collaborates with, or

collaborate with, and champion the efforts of others.	champions the efforts of others.	the efforts of others.	champions others' efforts.	champions others' efforts.
Promoting Positive Team Atmosphere: *Ability to foster a positive and productive team atmosphere and keep team members working together.* *(i) Is courteous and respectful with team members; (ii) Demonstrates a positive attitude using verbal and non-verbal cues, and tone. (iii) Inspires team members; (iv) Helps and encourages team members.*	Always upholds and promotes a constructive team atmosphere by exhibiting courtesy, respect and a positive attitude, and by offering motivation and assistance. Works tirelessly to try to keep people working well together.	Promotes a constructive team atmosphere by exhibiting courtesy, respect and a positive attitude, and by offering motivation and assistance. Tries to keep people working together.	Sometimes promotes a constructive team atmosphere by exhibiting courtesy, respect and a positive attitude, and offering motivation and assistance. At times tries to keep people working together.	Rarely supports a constructive team climate with regards to courtesy, respect, attitude, motivation and assistance. Does not try to keep people working together.
Addresses Conflict: *Ability to identify, respond to and resolve potentially damaging conflict*	Identifies and responds to negative conflict in a prompt and helpful manner. Fortifies team relations and	Identifies and responds to negative conflict, and is able to mediate it.	Sometimes identifies conflict and tries to manage it.	Rarely identifies and/or addresses conflict.

among team members.	productivity through skilful conflict mediation.			
Management of Multidisciplinary Teams: *Ability to appreciate, understand and work with multidisciplinary team members.*	Has great appreciation for and understanding of disciplines outside of own. Works profitably with multidisciplinary team members.	Has appreciation for and understanding of disciplines outside of own. Works effectively with multidisciplinary team members.	Has some appreciation for and understanding of disciplines outside of own, but works less effectively with multidisciplinary team members.	Has no appreciation for or understanding of disciplines outside of own. Is unable to work effectively with multidisciplinary team members.