

Final Report (marked by instructor)

Outcome/Category /Weight	Not demonstrated	Below expectation	Minimal pass	Meets expectation	Above expectation
Problem analysis / Identify Tools [MTHE-PA-3-2(a)] / 5	No mathematical models and tools used.	Discusses multiple applicable/relevant models or tools, with no justification on selection of which to implement based on analysis.	Discusses multiple applicable/relevant models or tools, with minimal justification on selection of which to implement based on analysis.	Analyses multiple applicable/relevant models or tools and makes a justified selection on which to implement based on analysis.	Expertly analyses multiple applicable/relevant models or tools and with comprehensive explanation and justification of the selection criteria and interpretation of results.
Investigation / Analysis [MTHE-IN-3-3(b)] / 10	No use of quantitative metrics and/or uses data collected to draw conclusions.	Use of quantitative metrics and/or uses data collected are irrelevant, incorrect or do not draw conclusions.	Uses quantitative metrics and/or uses data collected to draw weak conclusions.	Develops quantitative metrics and/or uses data collected to draw valid conclusions.	Develops reliable quantitative metrics and/or uses data collected to draw valid conclusions.
Investigation / Validation [MTHE-IN-3-3(c)] / 10	No experimentation to validate mathematical models and techniques.	Minimally or incorrectly uses experimentation to validate mathematical models and techniques.	Uses experimentation to validate mathematical models and techniques.	Uses experimentation to validate mathematical models and techniques and shows understanding of the necessity of model validation.	Uses experimentation to properly validate mathematical models and techniques and shows exemplary understanding of the necessity of model validation.
Design / Identify Design Problem [MTHE-DE-3-4(a)] / 5	Stakeholder needs contributing to design not identified.	Missing or trivial identification and consideration of stakeholder needs.	Significant stakeholders are identified with nominal description.	All relevant stakeholders are identified and their needs are well defined.	All relevant stakeholders are identified with clear descriptions, relevance, and impact of their needs.
Design / Design Specifications [MTHE-DE-3-4(b)] / 5	No explicit design criteria or constraints.	Missing, trivial, vague or unrelated criteria or constraints.	Simplistic criteria and constraints with some relevance to stakeholder needs.	Specific and measurable criteria and constraints developed from research and stakeholder needs.	Comprehensive, detailed and precise criteria and constraints logically developed from analysis of research and stakeholder needs.
Design / Idea Generation [MTHE-DE-3-4(c)] / 5	No evidence of creative thinking process, incorrect use of creative thinking tools, or an arbitrary approach.	Minor evidence of creative thinking process, incorrect use of creative thinking tools, or an arbitrary approach.	Modest evidence of creative thinking and application of creative thinking tools.	Evidence and explanation of effective use of creative thinking process/tools with descriptions of results produced.	Evidence and explanation of effective use of creative thinking process/tools, applied comprehensively within the project framework to generate a broad range of potential solutions.

Final Report (cont'd)

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Design / Assess Solution [MTHE-DE-3-4(d)] / 5	No assessment of final solution against project metrics.	Superficial assessment of final solution against project metrics.	Subjective, unsupported, or incomplete assessment of the final design against major project metrics.	Assessment of the overall design against all project metrics with supporting explanation.	Thorough assessment of specific design elements that provides a convincing explanation of design performance against well-defined project metrics.
Engineering tools / Develop Tools [MTHE-ET-3-5(a)] / 5	Does not identify or use mathematical tools or does not integrate when solving engineering problems	Identifies mathematical tools but does not integrate when solving engineering problems	Uses mathematical tools and discusses their application in solving engineering problems	Develops and applies mathematical tools and integrates them accurately in solving engineering problems	Develops sophisticated mathematical tools and integrates them seamlessly in solving engineering problems
Engineering tools / Understand Tools [MTHE-ET-3-5(b)] / 5	No mention of limitations of mathematical tools, or impacts of assumptions and simplifications.	Mentions limitations of mathematical tools briefly or as an afterthought with minimal thought of impacts of assumptions and simplifications.	Provides evidence of limitations of mathematical tools i.e. notes assumptions and simplifications etc.	Provides valid justification of limitations of mathematical tools i.e. attempts to justify assumptions and simplifications etc.	Provides exemplary justification of limitations of mathematical tools i.e. justifies assumptions, impacts of simplifications etc.
Engineering tools / Appropriate Tools [MTHE-ET-3-5(c)] / 5	No integration or discussion of multiple mathematical models to enhance model/system.	Integration or discussion of multiple mathematical models to enhance model/system is an afterthought and/or superficial.	Integrates or discusses multiple mathematical models to enhance model/system.	Integrates, or discusses the impact of using multiple sophisticated mathematical models effectively to increase complexity of model/system.	Integrates multiple sophisticated mathematical models effectively to increase complexity and/or validity of model/system and shows comprehensive understanding.
Communication / Discipline Conventions [MTHE-CO-3-7(a)] / 5	Demonstrates no knowledge of discipline-specific conventions.	Demonstrates knowledge of discipline-specific conventions. Explanations/analyses are unjustified and/or do not make sense.	Demonstrates a basic knowledge of discipline-specific conventions. Explanations/analyses are lengthy and do not maintain reader focus.	Demonstrates knowledge of discipline-specific conventions and uses them to enhance report. Gives explanations/analyses to maintain reader focus.	Demonstrates a superior knowledge of discipline-specific conventions (i.e. revision tracking, add/delete procedures etc.) and uses them appropriately and accurately to enhance report. Gives succinct explanations/analyses to maintain reader focus.
Communication / Technical Vocabulary [MTHE-CO-3-7(b)] / 10	Demonstrates no knowledge of technical vocabulary and/or is used incorrectly.	Demonstrates knowledge of technical vocabulary but is used inappropriately, inaccurately and erroneously.	Demonstrates a basic knowledge of technical vocabulary but is used inappropriately, inaccurately or erroneously.	Demonstrates knowledge of technical vocabulary and is used appropriately, accurately and with minor errors.	Demonstrates a superior knowledge of technical vocabulary and is used appropriately, accurately and with no errors.

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Professionalism / Codes & Standards [MTHE-PR-3-8(b)] / 10	Safety, regulatory compliance, and other professional practice elements (S, RC & PP) are not included, or considered.	S, RC & PP are an afterthought.	S, RC & PP are discussed as factors in the project but it is not evident as to how they influenced the design.	Elements of S, RC & PP are evident in design process, with references to relevant regulations.	S, RC & PP considerations are integrated into project with evidence as to how such compliance and risk mitigation played a clear role in the design process and impacted the final solution.
Impact of Engineering / Triple Bottom Line [MTHE-IM-3-9(a)] / 5	Missing or not considered in the design process.	Superficial or considered as an afterthought to the design process.	Noted in project description but not clearly considered as a factor in the design process with minimal consideration of impacts on Triple Bottom Line.	Relevant factors are identified and considered in the overall design process and consideration to impacts on Triple Bottom Line.	Report discussion conveys how relevant factors were explicitly applied in shaping the overall direction of the design and explicit impacts on Triple Bottom Line.
Economics / Economic Analysis [MTHE-EC-3-11(a)] / 5	Economic considerations are missing.	Economic considerations are minimal, or clearly an afterthought.	Engineering economics utilized at a basic level within project.	Justifiable economic considerations applied within design process.	Clear evidence as to how justifiable economic factors were derived and applied to influence project direction and decisions.
Life-long learning / Self-Education [MTHE-LL-3-12(b)] / 5	No consideration to methods and techniques for research, there is any research to analyse and/or conclusions are weak and/or incorrect.	Evidence methods and techniques for research are an afterthought. Research is reviewed, but analysis and reasoning are superficial and unjust and/or incorrect conclusions are made. Student does not connect the literature and its relevancy within their problem and within the discipline.	Evidence methods and techniques for research are considered and reviewed. Analysis and reasoning is applied to weakly create and support conclusions. Student identifies and connects how the literature applies and relevancy within their problem and within the discipline.	Evidence methods and techniques for research are used, and relevant research is reviewed. Analysis and reasoning is applied reliably to create and support conclusions. Student uses the literature to support arguments/claims, using a range of supporting issues drawn from the literature and translates issues into a relevant context for their problem and discipline.	Advanced methods and techniques for research are explicit, and reviews research in detail. Analysis and reasoning is applied reliably to create and support conclusions. Student uses the literature to support or refute arguments/claims, using a range of conflicting and supporting issues drawn from the literature and translates issues into a relevant context for their problem and discipline.