# PROJECT ASSESSMENT RUBRIC

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## Purpose

The purpose of a project assessment rubric for a software requirement project is to provide a clear and objective evaluation of the quality and completeness of the project deliverables. The rubric serves as a guide for the instructor or evaluator to assess the level of achievement of the students in meeting the learning objectives and requirements of the project. The rubric typically includes criteria and performance levels that correspond to different levels of achievement, allowing the evaluator to assign a score or grade based on the quality and completeness of the project deliverables. The rubric also helps to provide specific feedback to the students on their strengths and weaknesses in meeting the learning objectives and requirements of the project, enabling them to improve their skills and knowledge in software requirements engineering.

## Standard competencies

The project assessment rubric is a useful tool to evaluate the performance of students in a software requirements project. The rubric is constructed using the ACM computing curricula guidelines and is designed to assess the student's achievement in various areas of the project, including software requirements specification, verification and validation, communication, and documentation. The rubric is structured using the ABCD learning objectives model, which helps to align the objectives with the desired learning outcomes. By using this rubric, instructors can evaluate the students' progress and provide feedback to help them improve their skills and knowledge in software requirements engineering.

C.2.5: Software Engineering Competencies

Software Requirements

* 1. Identify and document software requirements by applying a known requirements elicitation technique in work sessions with stakeholders, using facilitative skills, as a contributing member of a requirements team.
  2. Analyze software requirements for consistency, completeness, and feasibility, and recommend improved requirements documentation
  3. Specify software requirements using standard specification formats and languages selected for the project and describe the requirements in an understandable way to non-experts such as end-users, other stakeholders, or administrative managers.
  4. Verify and validate the requirements using standard techniques, including inspection, modeling, prototyping, and test case development, as a contributing member of a requirements team.

## Explanation of terms

This project assessment rubric is designed to evaluate student achievement based on the ABCD Learning Objectives Model, which is aligned with the Bloom taxonomy of learning. The rubric is designed to assess student performance in the area of software requirements by evaluating their ability to effectively analyze, specify, verify, and validate requirements, as well as their ability to communicate requirements information to stakeholders in a clear and concise manner. The rubric provides clear criteria for each level of achievement, ranging from Outstanding to Beginning, to provide students with a clear understanding of their performance expectations. By using this rubric, instructors can provide students with meaningful feedback and encourage them to strive for excellence in their software requirements projects.

|  |  |
| --- | --- |
| **5** | **Outstanding:** The student research, evaluates, improves, and creates information |
| **4** | **Excellent:** The student research, investigates, analyses, and justifies information |
| **3** | **Established:** The student explores, explains, examines, and discusses information |
| **2** | **Developing:** The student outlines, describes and summarises information |
| **1** | **Beginning:** The student recognises, identifies, selects, and lists information |
| **N** | **Not Shown** |

# IDENTIFY

## IDENTIFY (I-1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Identify and document software requirements by applying a known requirements elicitation technique in work sessions with stakeholders, using facilitative skills | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | By the end of the project, the student should be able to analyze stakeholder needs and translate them into specific requirements, as well as use appropriate documentation techniques and tools to create a clear, concise, and complete documentation of system requirements. |
| **Sub-Category** | | |
| Identify and document system requirements | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently demonstrates a deep understanding of stakeholder needs and is able to translate them into highly detailed and comprehensive system requirements. The student consistently creates documentation that is clear, concise, and complete, using a variety of appropriate techniques and tools with exceptional skill. | |
| **4** | **Excellent** | The student consistently demonstrates a strong understanding of stakeholder needs and is able to translate them into detailed system requirements. The student consistently creates documentation that is clear, concise, and complete, using a variety of appropriate techniques and tools with strong proficiency. | |
| **3** | **Established** | The student demonstrates a good understanding of stakeholder needs and is able to translate them into well-defined system requirements. The student creates documentation that is mostly clear, concise, and complete, using appropriate techniques and tools with satisfactory proficiency. | |
| **2** | **Developing** | The student is still developing their understanding of stakeholder needs and is able to translate them into basic system requirements with some guidance. The student creates documentation that is partially clear, concise, and complete, using appropriate techniques and tools with limited proficiency. | |
| **1** | **Beginning** | The student has a limited understanding of stakeholder needs and struggles to translate them into specific system requirements. The student creates documentation that is unclear, incomplete, and/or poorly organized, using techniques and tools in an inconsistent and ineffective manner. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

## IDENTIFY (I-2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Identify and document software requirements by applying a known requirements elicitation technique in work sessions with stakeholders, using facilitative skills | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the project, the student should be able to effectively apply a known requirements elicitation technique during work sessions with stakeholders, by asking appropriate questions and using active listening skills to identify and prioritize requirements in order to develop a comprehensive and feasible project scope. |
| **Sub-Category** | | |
| Applying a known requirements elicitation technique in work sessions with stakeholders | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently applies a range of advanced requirements elicitation techniques during work sessions with stakeholders, demonstrating exceptional ability to ask probing questions and use active listening skills to identify and prioritize requirements in order to develop an optimal project scope. The student is able to effectively navigate challenging stakeholder dynamics and facilitate productive discussions to achieve project goals. | |
| **4** | **Excellent** | The student consistently applies a variety of requirements elicitation techniques during work sessions with stakeholders, demonstrating strong ability to ask relevant questions and use active listening skills to identify and prioritize requirements in order to develop a sound project scope. The student is able to effectively engage stakeholders and facilitate productive discussions to achieve project goals. | |
| **3** | **Established** | The student consistently applies appropriate requirements elicitation techniques during work sessions with stakeholders, demonstrating good ability to ask appropriate questions and use active listening skills to identify and prioritize requirements in order to develop a feasible project scope. The student is able to engage stakeholders and facilitate discussions to achieve project goals. | |
| **2** | **Developing** | The student is still developing their ability to apply requirements elicitation techniques during work sessions with stakeholders, demonstrating some ability to ask relevant questions and use active listening skills to identify and prioritize requirements in order to develop a basic project scope. The student may require some guidance and support to engage stakeholders and facilitate discussions. | |
| **1** | **Beginning** | The student has a limited ability to apply requirements elicitation techniques during work sessions with stakeholders, struggling to ask appropriate questions and use active listening skills to identify and prioritize requirements. The student may require significant guidance and support to engage stakeholders and facilitate discussions to achieve project goals. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

## IDENTIFY (I-3)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Identify and document software requirements by applying a known requirements elicitation technique in work sessions with stakeholders, using facilitative skills | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the project, the student should be able to effectively identify and document software requirements using facilitative skills, by applying appropriate questioning techniques and elicitation methods to identify stakeholder needs, engaging stakeholders in productive discussions, and using appropriate documentation techniques and tools to create clear, concise, and complete requirements documentation. |
| **Sub-Category** | | |
| Identify and document software requirements using facilitative skills | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently demonstrates exceptional ability to identify and document software requirements using facilitative skills, by applying advanced questioning techniques and elicitation methods to accurately and comprehensively identify stakeholder needs, facilitating productive discussions with stakeholders to clarify requirements, and using a variety of appropriate documentation techniques and tools to create highly detailed and comprehensive requirements documentation. | |
| **4** | **Excellent** | The student consistently demonstrates strong ability to identify and document software requirements using facilitative skills, by applying relevant questioning techniques and elicitation methods to effectively identify stakeholder needs, facilitating productive discussions with stakeholders to clarify requirements, and using appropriate documentation techniques and tools to create clear and comprehensive requirements documentation. | |
| **3** | **Established** | The student consistently demonstrates good ability to identify and document software requirements using facilitative skills, by applying appropriate questioning techniques and elicitation methods to accurately identify stakeholder needs, facilitating discussions with stakeholders to clarify requirements, and using appropriate documentation techniques and tools to create requirements documentation that is mostly clear and complete. | |
| **2** | **Developing** | The student is still developing their ability to identify and document software requirements using facilitative skills, demonstrating some ability to apply questioning techniques and elicitation methods to identify stakeholder needs, but may require some guidance and support to facilitate discussions and create requirements documentation that is clear and complete. | |
| **1** | **Beginning** | The student has a limited ability to identify and document software requirements using facilitative skills, struggling to apply appropriate questioning techniques and elicitation methods to identify stakeholder needs and facilitate discussions. The student may require significant guidance and support to create requirements documentation that is clear and complete. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

# ANALYZE

## ANALYZE (A-1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Analyze software requirements for consistency, completeness, and feasibility, and recommend improved requirements documentation | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the project, the student should be able to effectively analyze software requirements for consistency, completeness, and feasibility, by applying appropriate analytical techniques and tools to assess the quality of requirements documentation, identifying and resolving conflicts or gaps in requirements, and evaluating the technical and operational feasibility of requirements against project constraints and goals. |
| **Sub-Category** | | |
| Analyze software requirements for consistency, completeness, and feasibility | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently demonstrates exceptional ability to analyze software requirements for consistency, completeness, and feasibility, by applying advanced analytical techniques and tools to thoroughly assess the quality of requirements documentation, identifying and resolving complex conflicts or gaps in requirements, and effectively evaluating the technical and operational feasibility of requirements against project constraints and goals. | |
| **4** | **Excellent** | The student consistently demonstrates strong ability to analyze software requirements for consistency, completeness, and feasibility, by applying relevant analytical techniques and tools to effectively assess the quality of requirements documentation, identifying and resolving conflicts or gaps in requirements, and evaluating the technical and operational feasibility of requirements against project constraints and goals. | |
| **3** | **Established** | The student consistently demonstrates good ability to analyze software requirements for consistency, completeness, and feasibility, by applying appropriate analytical techniques and tools to accurately assess the quality of requirements documentation, identifying and resolving some conflicts or gaps in requirements, and evaluating the technical and operational feasibility of requirements against project constraints and goals. | |
| **2** | **Developing** | The student is still developing their ability to analyze software requirements for consistency, completeness, and feasibility, demonstrating some ability to apply analytical techniques and tools to assess the quality of requirements documentation, but may require some guidance and support to identify and resolve conflicts or gaps in requirements and evaluate feasibility against project constraints and goals. | |
| **1** | **Beginning** | The student has a limited ability to analyze software requirements for consistency, completeness, and feasibility, struggling to apply appropriate analytical techniques and tools to assess the quality of requirements documentation, identify and resolve conflicts or gaps in requirements, and evaluate feasibility against project constraints and goals. The student may require significant guidance and support to effectively analyze software requirements. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

## ANALYZE (A-2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Analyze software requirements for consistency, completeness, and feasibility, and recommend improved requirements documentation | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the course, the student should be able to effectively recommend improved requirements documentation, by identifying opportunities for enhancing the clarity, completeness, and quality of requirements documentation, proposing appropriate changes and revisions to requirements artifacts, and communicating recommendations in a clear and concise manner to relevant stakeholders. |
| **Sub-Category** | | |
| Recommend improved requirements documentation | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently demonstrates exceptional ability to recommend improved requirements documentation, by consistently identifying critical opportunities for enhancing the clarity, completeness, and quality of requirements documentation, proposing highly effective and appropriate changes and revisions to requirements artifacts, and communicating recommendations in a clear, concise, and persuasive manner to all relevant stakeholders. | |
| **4** | **Excellent** | The student consistently demonstrates strong ability to recommend improved requirements documentation, by regularly identifying opportunities for enhancing the clarity, completeness, and quality of requirements documentation, proposing effective and appropriate changes and revisions to requirements artifacts, and communicating recommendations in a clear and concise manner to most relevant stakeholders. | |
| **3** | **Established** | The student consistently demonstrates good ability to recommend improved requirements documentation, by often identifying opportunities for enhancing the clarity, completeness, and quality of requirements documentation, proposing appropriate changes and revisions to requirements artifacts, and communicating recommendations in a clear and concise manner to relevant stakeholders. | |
| **2** | **Developing** | The student is still developing their ability to recommend improved requirements documentation, demonstrating some ability to identify opportunities for enhancing the clarity, completeness, and quality of requirements documentation, but may require some guidance and support to propose appropriate changes and revisions to requirements artifacts and communicate recommendations clearly and effectively to relevant stakeholders. | |
| **1** | **Beginning** | The student has a limited ability to recommend improved requirements documentation, struggling to identify opportunities for enhancing the clarity, completeness, and quality of requirements documentation, proposing appropriate changes and revisions to requirements artifacts, and communicating recommendations clearly and effectively to relevant stakeholders. The student may require significant guidance and support to effectively recommend improved requirements documentation. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

# SPECIFY

## SPECIFY (S-1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Specify software requirements using standard specification formats and languages selected for the project and describe the requirements in an understandable way to non-experts such as end-users, other stakeholders, or administrative managers. | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the project, the student should be able to effectively specify software requirements using standard specification formats and languages selected for the project, by demonstrating a deep understanding of various requirement specification techniques and tools, selecting appropriate formats and languages to express different types of requirements, and ensuring the consistency, completeness, and correctness of requirements artifacts. |
| **Sub-Category** | | |
| Specify software requirements using standard specification formats and languages selected for the project | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently applies a variety of advanced specification techniques and tools, such as UML diagrams, use cases, and user stories, to create highly detailed and well-structured requirements documents that meet all project objectives and stakeholder needs. The student also consistently provides insightful and constructive feedback to peers to help them improve their own requirements documents. | |
| **4** | **Excellent** | The student consistently applies a variety of standard specification techniques and tools, such as functional and non-functional requirements, to create clear and well-organized requirements documents that meet most project objectives and stakeholder needs. The student also occasionally provides helpful feedback to peers to help them improve their own requirements documents. | |
| **3** | **Established** | The student mostly applies standard specification techniques and tools to create requirements documents that meet some project objectives and stakeholder needs, although there may be occasional inconsistencies or gaps in the documentation. The student sometimes provides feedback to peers but may not always be constructive or helpful. | |
| **2** | **Developing** | The student is able to apply basic specification techniques and tools to create requirements documents but may struggle with selecting appropriate formats and languages to express different types of requirements. The student may also have difficulties ensuring the consistency, completeness, and correctness of requirements artifacts. The student rarely provides feedback to peers. | |
| **1** | **Beginning** | The student has limited knowledge and skills in specifying software requirements and struggles to create effective requirements documents. The student may not be able to select appropriate formats and languages to express different types of requirements, and may not ensure the consistency, completeness, and correctness of requirements artifacts. The student does not provide feedback to peers. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

## SPECIFY (S-2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Specify software requirements using standard specification formats and languages selected for the project and describe the requirements in an understandable way to non-experts such as end-users, other stakeholders, or administrative managers. | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the project, the student should be able to effectively describe software requirements in an understandable way to non-experts such as end-users, other stakeholders, or administrative managers, by using appropriate communication techniques and tools to present requirements information in clear, concise, and non-technical language, addressing the needs and concerns of different audiences, and ensuring the accuracy and completeness of the information presented. |
| **Sub-Category** | | |
| Describe the requirements in an understandable way to non-experts such as end-users, other stakeholders, or administrative managers. | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student demonstrates an exceptional ability to effectively communicate requirements information to diverse audiences, using a variety of techniques and tools to ensure clarity, accuracy, and completeness of the information presented. The student proactively anticipates and addresses potential misunderstandings or concerns and provides insightful recommendations to stakeholders on how to improve the requirements documentation and communication process. | |
| **4** | **Excellent** | The student consistently uses appropriate communication techniques and tools to present requirements information in clear and concise language, addressing the needs and concerns of diverse audiences, and ensuring the accuracy and completeness of the information presented. The student proactively seeks feedback from stakeholders and incorporates it into the communication process and makes recommendations for improving the requirements documentation and communication process. | |
| **3** | **Established** | The student effectively communicates requirements information to diverse audiences, using appropriate techniques and tools to ensure clarity, accuracy, and completeness of the information presented. The student addresses most of the needs and concerns of different audiences and makes recommendations for improving the requirements documentation and communication process. | |
| **2** | **Developing** | The student sometimes struggles to effectively communicate requirements information to diverse audiences, using appropriate techniques and tools to ensure clarity, accuracy, and completeness of the information presented. The student may miss some of the needs and concerns of different audiences and may need some guidance in making recommendations for improving the requirements documentation and communication process. | |
| **1** | **Beginning** | The student has difficulty communicating requirements information to diverse audiences, using appropriate techniques and tools to ensure clarity, accuracy, and completeness of the information presented. The student frequently misses the needs and concerns of different audiences and requires significant guidance in making recommendations for improving the requirements documentation and communication process. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

# Verify and validate (V)

## Verify and validate (V-1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | | | |
| Verify and validate the requirements using standard techniques, including inspection, modeling, prototyping, and test case development. | | | |
| **Standard** | | | **Descriptor** |
| ACM C.25- Software Requirements-A | | | Upon completion of the course, the student should be able to effectively verify and validate software requirements by applying appropriate techniques and tools to ensure the correctness, completeness, and consistency of requirements artifacts, as well as to evaluate the technical and operational feasibility of requirements against project goals and constraints. |
| **Sub-Category** | | |
| Verify and validate the requirements | | |
| **Achievement Level** | | **The student:** | |
| **5** | **Outstanding** | The student consistently applies a wide range of techniques and tools to thoroughly verify and validate software requirements, identifying and resolving even subtle issues and inconsistencies. They effectively communicate the results of their verification and validation activities to stakeholders and use the feedback to further improve the quality of requirements artifacts. | |
| **4** | **Excellent** | The student applies a variety of techniques and tools to verify and validate software requirements, demonstrating a deep understanding of the importance of this activity. They proactively identify and address potential issues and inconsistencies in requirements documentation and provide valuable insights to improve the quality of the artifacts. | |
| **3** | **Established** | The student consistently applies standard techniques and tools to verify and validate software requirements, identifying most issues and inconsistencies. They effectively communicate the results of their verification and validation activities to stakeholders and use the feedback to improve the quality of requirements artifacts. | |
| **2** | **Developing** | The student sometimes applies standard techniques and tools to verify and validate software requirements but may miss some issues or inconsistencies. They are willing to learn and improve their skills, and effectively communicate the results of their verification and validation activities to stakeholders. | |
| **1** | **Beginning** | The student struggles to apply standard techniques and tools to verify and validate software requirements and may miss significant issues or inconsistencies. They need more guidance and practice to develop their skills and may not effectively communicate the results of their verification and validation activities to stakeholders. | |
| **N** | **Not Shown** | has not reached a standard scribed in any of these proficiencies | |

# Project Assessment Rubric

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project Stage** | **Category** | **Project 1** | | | | | | **Project 2** | | | | | | **Project 3** | | | | | | **Project 4** | | | | | | **Project 5** | | | | | |
| **Self** | **Peer Review** | | | | | **Self** | **Peer Review** | | | | | **Self** | **Peer Review** | | | | | **Self** | **Peer Review** | | | | | **Self** | **Peer Review** | | | | |
| **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** |
| **Identify** | Identify and document system requirements (I-1) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Applying a known requirements elicitation technique in work sessions with stakeholders (I-2) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Identify and document software requirements using facilitative skills (I-3) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Analyze** | Analyze software requirements for consistency, completeness, and feasibility (A-1) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Recommend improved requirements documentation (A-2) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Specify** | Specify software requirements using standard specification formats and languages selected for the project (S-1) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Describe the requirements in an understandable way to non-experts such as end-users, other stakeholders, or administrative managers. (S-2) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Verify and validate** | Verify and validate the requirements |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |