Concepts for the Dimensions of Engineering Literacy

| Engineering Habits of Mind | Optimism | Engineers, as a general rule, believe that things can always be improved. Just because it hasn’t been done yet, doesn’t mean it can’t be done. Good ideas can come from anywhere and engineering is based on the premise that everyone is capable of designing something new or different. |
| Persistence | Failure is expected, even embraced, as engineers work to optimize the solution to a particular challenge. Engineering – particularly engineering design – is an iterative process. It is not about trial and error. It is trying and learning and trying again. |
| Collaboration | Engineering successes are built through collaboration and communication. Teamwork is essential. The best engineers are willing to work with others. They are skilled at listening to stakeholders, thinking independently, and then sharing ideas. |
| Creativity | Being able to look at the world and identify new patterns or relationships or imagine new ways of doing things is something at which engineers excel. Finding new ways to apply knowledge and experience is essential in engineering design and is a key ingredient of innovation. |
| Conscientiousness | Engineering has a significant ethical dimension. The technologies and methods that engineers develop can have a profound effect on people’s lives. That kind of power demands a high level of responsibility to consider others and to consider the moral issues that may arise from the work. |
| System Thinking | Our world is a system made up of many other systems. Things are connected in remarkably complex ways. To solve problems, or to truly improve conditions, engineers need to be able to recognize and consider how all those different systems are connected. |

| Engineering Practice | Engineering Design | • Problem Framing  
| |     | • Information Gathering  
| |     | • Ideation  
| | |     | • Prototyping  
| | |     | • Engineering Graphics  
| | |     | • Decision Making  
| | |     | • Project Management  
| | |     | • Design Methods  
| | |     | • Design Communication  
| Material Processing | • Measurement & Precision  
| | |     | • Manufacturing  
| | |     | • Fabrication  
| | |     | • Material Classification  
| | |     | • Joining  
| | |     | • Casting/Molding/Forming  
| | |     | • Separating/Machining  
| | |     | • Conditioning/Finishing  
| | |     | • Safety  
| Quantitative Analysis | • Computational Thinking  
| | |     | • Computational Tools  
| | |     | • Data Collection, Analysis, & Communication  
| | |     | • System Analytics  
| | |     | • Modeling & Simulation  
| Professionalism | • Professional Ethics  
| | |     | • Workplace Ethics  
| | |     | • Honoring Intellectual Property  
| | |     | • Impacts of Technology  
| | |     | • Role of Society in Technological Development  
| | |     | • Engineering-Related Careers  
| Engineering Sciences | • Statics  
| | |     | • Mechanics of Materials  
| | |     | • Dynamics  
| | |     | • Thermodynamics  
| | |     | • Fluid Mechanics  
| | |     | • Mass Transfer & Separation  
| | |     | • Chemical Reactions & Catalysis  
| | |     | • Circuit Theory  
| | |     | • Heat Transfer  
| Engineering Mathematics | • Engineering Algebra  
| | |     | • Engineering Geometry & Trigonometry  
| | |     | • Engineering Statistics & Probability  
| | |     | • Engineering Calculus  
| Engineering Technical Applications | • Electrical Power  
| | |     | • Communication Technologies  
| | |     | • Computer Architecture  
| | |     | • Process Design  
| | |     | • Structural Analysis  
| | |     | • Environmental Considerations  
| | |     | • Hydrologic Systems  
| | |     | • Infrastructure  
| | |     | • Geotechnics  
| | |     | • Chemical Applications  
| | |     | • Machine Design  
| | |     | • Electronics  

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