

# LiTH Syllabus in English Ver 1.1<sup>1</sup>

## 1. Disciplinary knowledge and reasoning

- 1.1. Knowledge of underlying mathematics and science (courses on G1X-level)
- 1.2. Fundamental engineering knowledge (courses on G1X-level)
- 1.3. Further knowledge, methods, and tools in any of: mathematics, natural science, engineering (courses on G2X-level)
- 1.4. Advanced knowledge, methods, and tools in any of: mathematics, natural science, engineering (courses on A1X-level)
- 1.5. Insight into current research and development work

## 2. Personal and professional skills and attributes

- 2.1. Analytical reasoning and problem solving
  - 2.1.1. Problem identification and formulation
  - 2.1.2. Modelling
  - 2.1.3. Estimation and qualitative analysis
  - 2.1.4. Analysis with uncertainty
  - 2.1.5. Solution and recommendations
- 2.2. Experimentation, investigation, and knowledge discovery
  - 2.2.1. Hypothesis formulation
  - 2.2.2. Survey of print and electronic literature
  - 2.2.3. Experimental inquiry
  - 2.2.4. Hypothesis test and defence
- 2.3. System thinking
  - 2.3.1. Thinking holistically
  - 2.3.2. Emergence and interactions in systems
  - 2.3.3. Prioritization and focus
  - 2.3.4. Trade-offs, judgements and balance in resolution
- 2.4. Attitudes, thought, and learning
  - 2.4.1. Initiative and willingness to make decisions in the face of uncertainty
  - 2.4.2. Perseverance, urgency and will to deliver, resourcefulness and flexibility
  - 2.4.3. Creative thinking
  - 2.4.4. Critical thinking
  - 2.4.5. Self-awareness, metacognition and knowledge interaction
  - 2.4.6. Lifelong learning and educating
  - 2.4.7. Time and resource management
- 2.5. Ethics, equity, and other responsibilities
  - 2.5.1. Ethics, integrity and social responsibility
  - 2.5.2. Professional behaviour
  - 2.5.3. Proactive vision and intention in life
  - 2.5.4. Staying current on the world of engineering
  - 2.5.5. Equity and diversity
  - 2.5.6. Trust and loyalty

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<sup>1</sup> The document is based on LiTH Syllabus 3.2 in Swedish.

### **3. Interpersonal skills: Teamwork and communication**

- 3.1. Teamwork
  - 3.1.1. Forming effective teams
  - 3.1.2. Team operation
  - 3.1.3. Team growth and evolution
  - 3.1.4. Team leadership
  - 3.1.5. Technical and multidisciplinary teaming
  
- 3.2. Communications
  - 3.2.1. Communications strategy
  - 3.2.2. Communications structure
  - 3.2.3. Written communication
  - 3.2.4. Electronic/multimedia communication
  - 3.2.5. Graphical communications
  - 3.2.6. Oral presentation
  - 3.2.7. Inquiry, listening and dialog
  - 3.2.8. Negotiation, compromise and conflict resolution
  - 3.2.9. Advocacy
  - 3.2.10. Establishing diverse connections and networking
  
- 3.3. Communication in foreign languages
  - 3.3.1. Communications in English
  - 3.3.2. Communications in languages of regional commerce and industry
  - 3.3.3. Communications in other languages

## **4. Conceiving, designing, implementing, and operating systems in the enterprise, societal and environmental context**

- 4.1. Societal conditions, including economically, socially and ecologically sustainable development
  - 4.1.1. Roles and responsibility of engineers
  - 4.1.2. The impact of engineering on society and the environment
  - 4.1.3. Society's regulation of engineering
  - 4.1.4. The historical and cultural context
  - 4.1.5. Contemporary issues and values
  - 4.1.6. Developing a global perspective
  - 4.1.7. Sustainability and the need for sustainable development
- 4.2. Enterprise and business context
  - 4.2.1. Appreciating different enterprise cultures
  - 4.2.2. Enterprise stakeholders, strategy and goals
  - 4.2.3. Technical entrepreneurship
  - 4.2.4. Working in organizations
  - 4.2.5. Working in international organizations
  - 4.2.6. New technology development and assessment
  - 4.2.7. Engineering project finance and economics
- 4.3. Conceiving, system engineering and management
  - 4.3.1. Understanding needs and setting goals
  - 4.3.2. Defining function, concept and architecture
  - 4.3.3. System engineering, modelling and interfaces
  - 4.3.4. Development project management
- 4.4. Designing
  - 4.4.1. The design process
  - 4.4.2. The design process phasing and approaches
  - 4.4.3. Utilization of knowledge in design
  - 4.4.4. Disciplinary design
  - 4.4.5. Multidisciplinary design
  - 4.4.6. Design for sustainability, safety, aesthetics, operability and other objectives
- 4.5. Implementing
  - 4.5.1. Designing a sustainable implementation process
  - 4.5.2. Hardware manufacturing process
  - 4.5.3. Software implementing process
  - 4.5.4. Hardware software integration
  - 4.5.5. Test, verification and certification
  - 4.5.6. Implementation management
- 4.6. Operating
  - 4.6.1. Designing and optimizing sustainable and safe operations
  - 4.6.2. Training and operations
  - 4.6.3. Supporting and system life cycle
  - 4.6.4. System improvement and evolution
  - 4.6.5. Disposal and life-end issues
  - 4.6.6. Operations management

## **5. Planning, execution, and presentation of research or development projects with respect to scientific and societal needs and requirements**

- 5.1. Societal conditions, including economic, social, and ecological aspects of sustainable development within research or development projects
  - 5.1.1. Roles and responsibility of the individual
  - 5.1.2. The impact of the subject on society and environment
  - 5.1.3. Rules and regulations
  - 5.1.4. Historical and cultural context
  - 5.1.5. Contemporary issues and values
  - 5.1.6. Developing a global perspective
  - 5.1.7. Sustainability and the need for sustainable development
- 5.2. Economic conditions for research or development projects
  - 5.2.1. Understanding of different models for financing and management control
  - 5.2.2. Planning, strategies, and goals for research or development projects
  - 5.2.3. Knowledge-based entrepreneurship
  - 5.2.4 Working in organizations
  - 5.2.5 Working in international organizations
  - 5.2.6 Knowledge development and evaluation
- 5.3. Identification of needs, structuring and planning of research or development projects
  - 5.3.1. Specifying the project's purpose and goal with respect to sustainability and other needs
  - 5.3.2. Defining function, concept, and limitations
  - 5.3.3. Structuring the components and ensuring the fulfillment of goals
  - 5.3.4. Managing projects in the planning phase
- 5.4. Execution of research or development projects
  - 5.4.1. Phases and methodology of the development project
  - 5.4.2. Disciplinary projects
  - 5.4.3. Multidisciplinary projects
  - 5.4.4. Design of a sustainable execution phase
  - 5.4.5. Design and planning of experiments
  - 5.4.6. Interaction between theoretical and experimental work
  - 5.4.7. Test and verification of new results
  - 5.4.8. Management and assessment of development projects in the execution phase
- 5.5. Presentation and evaluation of research or development projects
  - 5.5.1. Presentation of new knowledge in a scientific context
  - 5.5.2. Presentation of new knowledge in a wider context
  - 5.5.3. Transfer of new knowledge for use in the enterprise context
  - 5.5.4. Evaluation of the work process in the project