1. Assessment

1.a. Organizational assessment
1.b. Professional licensure
  1.b.i. Chartered engineer
  1.b.ii. Professional engineer
    1. Fundamentals of Engineering exam
1.c. Program evaluation
  1.c.i. Accreditation
    1. ABET
    2. Criteria
  1.c.ii. Advisory boards
  1.c.iii. Course assessment
  1.c.iv. External evaluation
  1.c.v. Multilevel program assessment
1.d. Student assessment
  1.d.i. Assessment tools
    1. Feedback
      a. 360 degree
    2. Grades
      a. Automated grading
      b. Grading systems
      c. Inflation
    3. Concept Inventory
    4. Portfolios
    5. Rubric
    6. Test format [syn: Exam format]
      a. Multiple choice
      b. Open ended tests
      c. Practical examinations [syn: Clinical examinations]
      d. Standardized
  1.d.ii. Knowledge gain
  1.d.iii. Knowledge retention
  1.d.iv. Performance
  1.d.v. Method
    1. Continuous
    2. Diagnostic
    3. Formative
    4. Peer review
    5. Outcomes based assessment
    6. Self assessment
    7. Summative
  1.d.vi. Setting
    1. Individual
    2. Group
    3. Online
    4. Workplace

2. Design

2.a. Design practice
  2.a.i. Ideation
  2.a.ii. Information gathering
  2.a.iii. Modeling
    1. Physical modeling
      a. 3D modeling
      b. Computer-aided design
      c. Prototyping
        i. Rapid prototyping
    2. Process modeling
      a. Flowcharting
  2.a.iv. Needs analysis
  2.a.v. Problem definition
  2.a.vi. Product testing
2.b. Design projects
  2.b.i. Capstone projects [syn: Senior projects, Senior design]
  2.b.ii. Design competitions
  2.b.iii. Multidisciplinary design
2.c. Design process
  2.c.i. Human centered design [syn: User centered design]
  2.c.ii. Product archaeology [syn: Product dissection, Reverse engineering]
  2.c.iii. Product development
2.d. Design thinking

3. Diversity

- 3.a. Diversity concerns
  - 3.a.i. Bias
  - 3.a.ii. Discrimination
  - 3.a.iii. Equity
  - 3.a.iv. Inclusivity
  - 3.a.v. Multiculturalism
  - 3.a.vi. Student diversity
  - 3.a.vii. Underrepresentation [syn: Underrepresented students]
  - 3.a.viii. Workplace diversity
- 3.b. Types of diversity
  - 3.b.i. Gender
    1. Female [syn: Women, Girls]
    2. Male
    3. Transgender
  - 3.b.ii. Individual differences
    1. Learning styles
    2. Personality types
  - 3.b.iii. Nontraditional students
    1. Commuter students
    2. Part time students
    3. Transfer students
    4. Veterans
  - 3.b.iv. Race/Ethnicity
  - 3.b.v. Sexual orientation
  - 3.b.vi. Student background
    1. First generation
    2. International students
    3. Socioeconomic status
  - 3.b.vii. Students with disabilities

4. Educational level

- 4.a. Continuing education
- 4.b. Graduate education [syn: Postgraduate]
  - 4.b.i. Graduate
    1. Master's students
    2. PhD students [syn: Doctoral students]
  - 4.b.ii. Supervision
- 4.c. Higher education [syn: College, University]
- 4.d. P-12 [syn: P12, K-12, K12]
  - 4.d.i. Elementary school [syn: Primary school]
  - 4.d.ii. High school
    1. Advanced Placement courses
    2. Pre college preparation
  - 4.d.iii. Middle school
  - 4.d.iv. Preschool
  - 4.d.v. Pre-engineering
- 4.e. Postdoctoral studies
- 4.f. Undergraduate
  - 4.f.i. First year [syn: Freshmen, Freshman]
    1. First year curriculum
    2. First year experience
  - 4.f.ii. Junior
  - 4.f.iii. Senior
  - 4.f.iv. Sophomore

5. Educational setting

5.a. Engineering curriculum
5.b. Engineering fields
- 5.b.i. Aerospace engineering
- 5.b.ii. Architectural engineering
- 5.b.iii. Biomedical engineering
- 5.b.iv. Chemical engineering
- 5.b.v. Civil engineering
- 5.b.vi. Computer engineering
- 5.b.vii. Computer science
- 5.b.viii. Construction engineering
- 5.b.ix. Electrical engineering
- 5.b.x. Engineering technology
- 5.b.xi. Environmental engineering
- 5.b.xii. Humanitarian engineering
- 5.b.xiii. Information technology
  1. Green engineering
  2. Sustainability
- 5.b.xiv. Industrial engineering
- 5.b.xv. Manufacturing
- 5.b.xvi. Materials science and engineering
- 5.b.xvii. Mechanical engineering
- 5.b.xviii. Mechatronics engineering
- 5.b.xix. Ocean engineering [syn: Marine engineering]
- 5.b.xx. Nuclear engineering

5.c. Informal learning [syn: Outreach]
5.d. Institution type
- 5.d.i. Baccalaureate institutions
- 5.d.ii. Community colleges
- 5.d.iii. Doctoral institutions
- 5.d.iv. Hispanic serving institutions (HSIs)
- 5.d.v. Historically black colleges/universities (HBCUs)
- 5.d.vi. Master's institutions
- 5.d.vii. Single gender campuses
- 5.d.viii. Technical colleges
- 5.d.ix. Tribal colleges

5.e. Learning environment
- 5.e.i. Classroom
- 5.e.ii. Co-curricular
- 5.e.iii. COVID [syn: COVID-19, COVID19]
- 5.e.iv. Extracurricular
- 5.e.v. Honors programs
- 5.e.vi. International programs
- 5.e.vii. Laboratory
- 5.e.viii. Learning communities
- 5.e.ix. Maker space
- 5.e.x. Pandemic
- 5.e.xi. Studio
- 5.e.xii. Undergraduate research

6. Educational technology [syn: E-learning]

6.a. Computer-based instruction [syn: Internet-based instruction]
- 6.a.i. Games
- 6.a.ii. Gamification
- 6.a.iii. Educational software

6.b. Electronic communication
- 6.b.i. Blog
- 6.b.ii. Email
- 6.b.iii. Groupware
- 6.b.iv. Instant messaging
- 6.b.v. Online discussions
  1. Web discussions [syn: Chat]
  2. Wikis
- 6.b.vi. Online repositories
- 6.b.vii. Social media
- 6.b.viii. Streaming Media
  1. Streaming audio [syn: Podcast]
  2. Streaming video

6.c. Learning technology
- 6.c.i. Adaptive computer learning
- 6.c.ii. Learning management systems
- 6.c.iii. Personal response system [syn: Clicker]
- 6.c.iv. Simulation
- 6.c.v. Mobile applications
- 6.c.vi. Open Educational Resources
- 6.c.vii. Pen and touch devices
- 6.c.viii. Virtual reality

6.d. Learning modality
- 6.d.i. Blended learning
- 6.d.ii. Distance learning
  1. Asynchronous
  2. Massive Open Online Classes (MOOCs)
  3. Synchronous
- 6.d.iii. Remote laboratory [syn: Virtual laboratory]

7. Instruction

- 7.a. Conceptual learning [syn: Conceptual change]
  - 7.a.i. Concept inventories
  - 7.a.ii. Concept maps
  - 7.a.iii. Misconceptions
  - 7.a.iv. Preconceptions
  - 7.a.v. Threshold concepts
- 7.b. Faculty [syn: Instructors]
  - 7.b.i. Faculty attitudes
  - 7.b.ii. Faculty development [syn: Educational development]
    1. Pedagogical content knowledge
    2. Reflective practice
    3. Teaching skills
  - 7.b.iii. Instructional role
    1. Adjunct
    2. Advisor
    3. Graduate teaching assistant
    4. Instructor
    5. Peer teaching assistant
  - 7.b.iv. Teaching philosophies
  - 7.b.v. Team teaching
- 7.c. Institutional change [syn: Institutional transformation, Organizational change]
  - 7.c.i. Evidence-based practice
  - 7.c.ii. Institutional culture
  - 7.c.iii. Instructional change
  - 7.c.iv. Research to practice
    1. Adoption
    2. Diffusion
    3. Dissemination
    4. Propagation
  - 7.c.v. Theories of change
- 7.d. Instructional design
  - 7.d.i. Alignment
  - 7.d.ii. Bloom's taxonomy
  - 7.d.iii. Course design
  - 7.d.iv. Backwards design
  - 7.d.v. Learning objectives
- 7.e. Instructional methods [syn: Pedagogy]
  - 7.e.i. Active learning
    1. Experiential learning
    2. Inquiry based learning
    3. Peer instruction
    4. Challenge based instruction
  - 7.e.ii. Critical pedagogy
  - 7.e.iii. Design based learning
  - 7.e.iv. Flipped classroom
  - 7.e.v. Lecture
  - 7.e.vi. Model-eliciting activities
  - 7.e.vii. Mutual learning models
    1. Collaborative learning
    2. Cooperative learning
    3. Team based learning
  - 7.e.viii. Problem based learning
  - 7.e.ix. Project based learning
  - 7.e.x. Service learning
- 7.f. Professional development
- 7.g. Teaching evaluations

8. Outcomes

- 8.a. Communication
  - 8.a.i. Audiences
  - 8.a.ii. Communication skills
    1. Nonverbal
    2. Verbal
       - a. Listening
       - b. Oral presentations
       - c. Speaking
    3. Visual communication
       - a. Engineering graphics
       - b. Illustrations
    4. Visualization [syn: Spatial skills]
    5. Written communication
       - a. Argumentation
       - b. Reading
       - c. Writing
  - 8.a.iii. Foreign languages
  - 8.a.iv. Technical communication
- 8.b. Competence
- 8.c. Computing skills [syn: Computing knowledge]
- 8.d. Computational thinking
- 8.e. Creativity
- 8.f. Critical thinking
- 8.g. Empathy
- 8.h. Engagement
- 8.i. Engineering standards
- 8.j. Entrepreneurship
- 8.k. Ethics
  - 8.k.i. Academic dishonesty [syn: Academic integrity]
    1. Plagiarism
  - 8.k.ii. Social justice
  - 8.k.iii. Social responsibility
- 8.l. Information literacy [syn: Information fluency]
- 8.m. Innovation
- 8.n. Intercultural competence [syn: Global]
  - 8.n.i. Cultural schemas
- 8.o. Leadership
- 8.p. Lifelong learning
- 8.q. Problem solving
- 8.r. Professional skills [syn: Soft skills]
- 8.s. Scientific literacy
- 8.t. Socio-technical thinking
- 8.u. Student perception
- 8.v. Student experience
- 8.w. Teamwork [syn: Team skills]
- 8.x. Reflection
  - 8.x.i. Critical reflection
- 8.y. Systems thinking

9. Professional practice

- 9.a. Careers
  - 9.a.i. Career choice
  - 9.a.ii. Career paths
- 9.b. Engineering profession
  - 9.b.i. Employers
  - 9.b.ii. Employment
  - 9.b.iii. Workplace culture
- 9.c. Engineering management
- 9.d. Industry involvement
  - 9.d.i. Cooperative education
  - 9.d.ii. Industry sponsorship
  - 9.d.iii. Internships

10. Recruitment and retention

10.a. Academic support
- 10.a.i. Supplemental instruction
- 10.a.ii. Tutoring

10.b. Achievement

10.c. Advising
- 10.c.i. Academic advising
- 10.c.ii. Coaching
- 10.c.iii. Mentoring
  1. Peer mentoring

10.d. Preparation

10.e. Recruitment
- 10.e.i. Engineering recruitment
  1. ~~Engineering~~ pathways [syn: ~~Engineering~~ pipeline]
- 10.e.ii. Matriculation
- 10.e.iii. Enrollment

10.f. Retention
- 10.f.i. Attrition
- 10.f.ii. Persistence
- 10.f.iii. Retention rate
- 10.f.iv. Scholarships
- 10.f.v. Time to degree

10.g. Study behaviors
- 10.g.i. Study groups
- 10.g.ii. Time management

10.h. Student development
- 10.h.i. Absenteeism
- 10.h.ii. Mental health
  1. Test anxiety
  2. Depression
  3. Stress
- 10.h.iii. Physical health

11. Related fields

11.a. Engineering economics
- 11.a.i. Employability
  1. Industry demand

11.b. Education policy
- 11.b.i. Bologna process
- 11.b.ii. Common core state standards

11.c. Mathematics
- 11.c.i. Calculus
- 11.c.ii. Complex numbers
- 11.c.iii. Differential equations
- 11.c.iv. Engineering mathematics
- 11.c.v. Graphing
- 11.c.vi. Linear algebra
- 11.c.vii. Pre-calculus
- 11.c.viii. Probability theory
- 11.c.ix. Statistics

11.d. Philosophy of engineering education

11.e. Science
- 11.e.i. Biology
- 11.e.ii. Chemistry
- 11.e.iii. Geoscience
- 11.e.iv. Life science
- 11.e.v. Physical science
- 11.e.vi. Physics
- 11.e.vii. Technology applications

11.f. STEM

11.g. Technology studies

12. Research approaches

- 12.a. Data collection
  - 12.a.i. Analytics
  - 12.a.ii. Focus groups
  - 12.a.iii. Interviews
  - 12.a.iv. Observations
  - 12.a.v. Multi-institution
  - 12.a.vi. Survey
- 12.b. Research ethics
  - 12.b.i. Ethical treatment of subjects
  - 12.b.ii. Professional research ethics
- 12.c. Research evaluation criteria
  - 12.c.i. Credibility
  - 12.c.ii. Dependability
  - 12.c.iii. Generalizability
  - 12.c.iv. Reliability
  - 12.c.v. Transferability
  - 12.c.vi. Trustworthiness
  - 12.c.vii. Validity
- 12.d. Research methods
  - 12.d.i. Action research
  - 12.d.ii. Design-based research
  - 12.d.iii. Mixed methods research
  - 12.d.iv. Multi-modal approaches
  - 12.d.v. Qualitative
    1. Case Study
    2. Content analysis
       a. Discourse analysis
       b. Document analysis
    3. Ethnography
    4. Grounded theory
    5. Narrative inquiry
    6. Phenomenology
    7. Phenomenography
    8. Photoelicitation
  - 12.d.vi. Quantitative
    1. Data correlation
    2. Descriptive statistics
    3. Experimental research
    4. Factor analysis
    5. Inferential statistics
    6. Psychometric analysis
    7. Regression
    8. Structural equation modeling
  - 12.d.vii. Systematic review
    1. Meta-analysis

13. Theoretical frameworks

- 13.a. Affective theories
  - 13.a.i. Emotion
    1. Emotional learning
  - 13.a.ii. Motivation
    1. Achievement goal orientation theory [syn: Deep learning, Mastery learning]
    2. Attribution theory
    3. Behavior theory [syn: Behaviorism]
    4. Expectancy Value theory
    5. Self-determination theory
  - 13.a.iii. Self efficacy
- 13.b. Cognitive theories
  - 13.b.i. Constructivist
    1. Expert-novice
  - 13.b.ii. Knowledge transfer
  - 13.b.iii. Self regulated learning
    1. Metacognition
- 13.c. Critical theory
  - 13.c.i. Intersectionality
- 13.d. Developmental theory
  - 13.d.i. Adult learning theory
  - 13.d.ii. Agency
  - 13.d.iii. Model of domain learning
  - 13.d.iv. Identity
  - 13.d.v. Perry's model of intellectual development
  - 13.d.vi. Piaget's theory of cognitive development
- 13.e. Epistemology
- 13.f. Social cognitive theories [syn: Social learning theory]
  - 13.f.i. Activity theory
  - 13.f.ii. Cognitive apprenticeship
  - 13.f.iii. Community of practice
  - 13.f.iv. Social cognitive career theory

14. Teams [syn: Groups]

14.a. Interdisciplinary
14.b. Mental models
14.c. Multidisciplinary
14.d. Self managing work teams
14.e. Team dynamics
    14.e.i. Nominal group technique
    14.e.ii. Team development [syn: Group development]
    14.e.iii. Team formation
    14.e.iv. Team performance
    14.e.v. Team roles
14.f. Teamwork training
14.g. Transdisciplinary
14.h. Virtual teams [syn: Distributed]