

Table B.7.b.3: Technology 496 Industrial Project Management – Senior Design Capstone (Scarborough, 2005)

★ = range of cognitive processing
 ✓ = yes on if Bloom's knowledge category is met

| ABET/TAC/NAIT Engineering & Technology | Bloom's Knowledge Dimension | Dale's Cone | Student Learning Outcomes | Bloom's Cognitive Process Dimension | | | | | |
|---|-----------------------------|-------------|---|-------------------------------------|--------------------------|-------------------|------------------|--------------------|-----------------|
| | | | | Knowledge Remember | Comprehension Understand | Application Apply | Analysis Analyze | Synthesis Evaluate | Evaluate Create |
| A. Mastery of knowledge, techniques, skills, modern tools of disciplines. | ✓ Factual Knowledge: | Active | 6. To demonstrate effective project: a. planning b. initiation c. execution d. termination | ★ | → | → | → | → | ★ |
| | ✓ Conceptual Knowledge: | | | | | | | | |
| | ✓ Procedural Knowledge: | | | | | | | | |
| | ✓ Meta-cognitive Knowledge: | | | | | | | | |
| B. Apply current knowledge and adapt to emerging applications of math, science, engineering, and technology. | ✓ Factual Knowledge: | Active | 8. To integrate mathematics, the sciences, communication, management, technical, and technological knowledge and skills to accomplish team and project objectives. | ★ | → | → | → | → | ★ |
| | ✓ Conceptual Knowledge: | | | | | | | | |
| | ✓ Procedural Knowledge: | | | | | | | | |
| | ✓ Meta-cognitive Knowledge: | | | | | | | | |
| C. Conduct, analyze, and interpret experiments; apply experimental results to improve processes. | Factual Knowledge: | | NA | | | | | | |
| | Conceptual Knowledge: | | | | | | | | |
| | Procedural Knowledge: | | | | | | | | |
| | Meta-cognitive Knowledge: | | | | | | | | |

NIU Gen Ed Goals - Students:
a.iii. perform basic computations, display facility with use of formal and quantitative reasoning analysis and problem solving, and interpret mathematical models and statistical information.

Gen Ed Goals - Students:
b. develop an ability to use modes of inquiry across a variety of disciplines in the humanities and the arts, the physical sciences and mathematics, and social sciences.
b.iv. demonstrate an ability to use scientific methods and theories to understand the phenomena studied in the natural and social sciences.

Engineering & Technology

D. ability to apply creativity in the design of systems, components, or processes appropriate to program objectives.

NIU Gen Ed Goals - Students:
c. develop an understanding of the relatedness of various disciplines by integrating knowledge from several disciplines and applying that knowledge to an understanding of important problems and issues.

E. Function effectively on teams.

NIU Gen Ed Goals-Students:
b.iii. demonstrate a knowledge of cultural traditions and philosophical ideas that have shaped societies, civilizations, and human self-conceptions.
d. develop social responsibility and preparation for citizenship through global awareness, environmental sensitivity, and an appreciation of cultural diversity.

Bloom's Knowledge Dimension **Dale's Cone**

- ✓ Factual Knowledge: Active
- ✓ Conceptual Knowledge:
- ✓ Procedural Knowledge:
- ✓ Meta-cognitive Knowledge:

- ✓ Factual Knowledge: Active
- ✓ Conceptual Knowledge:
- ✓ Procedural Knowledge
- ✓ Meta-cognitive Knowledge:

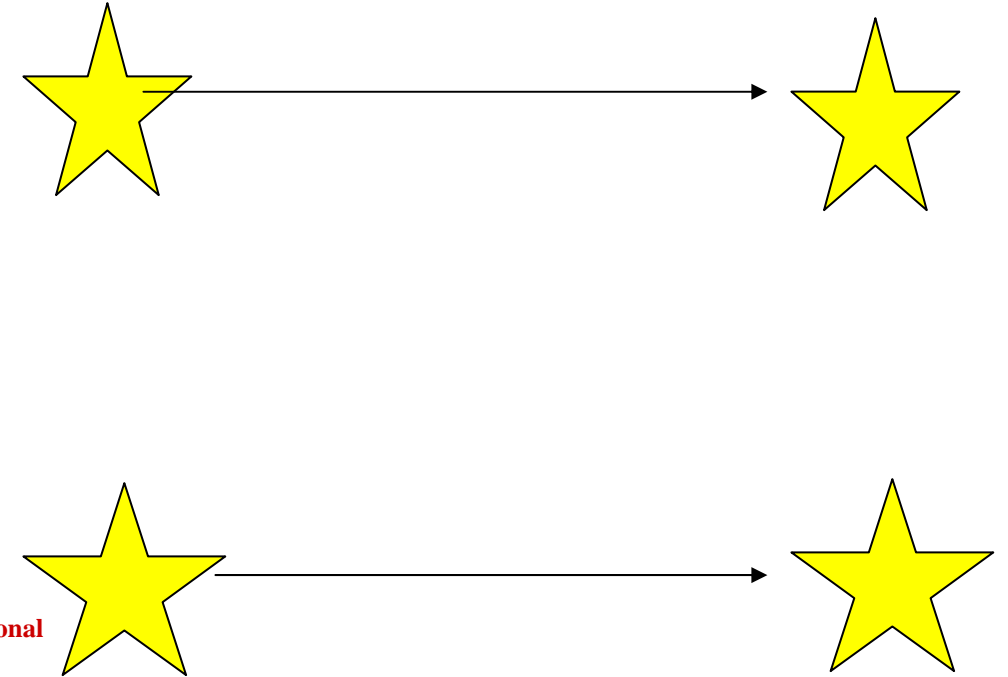
Student Learning Outcomes

8. To integrate mathematics, the sciences, communication, management, technical, technological knowledge and skills to accomplish team and project objectives.
a. design a vehicle to technical specifications
b. build the vehicle to technical specifications
c. solve technical problems associated with design, construction, and evaluation
d. test and evaluate vehicle against technical specifications

- 1. To identify and describe major problems, issues, concerns, and solutions that relate to projects, PM, Pteams, and P leaders, international projects, and multi-cultural teams.**
- 2. To identify and describe best practices for managing projects and leading teams, including international projects and multi-cultural teams.**
- 3. To perform effectively on a project team (multi-cultural when possible)**
 - a. To engage in conflict resolution to resolve team issues.**

Bloom's Cognitive Process Dimension

Knowledge Remember **Comprehension Understand** **Application Apply** **Analysis Analyze** **Synthesis Evaluate** **Evaluate Create**



**ABET/TAC/NAIT
Engineering & Technology**

Bloom's Knowledge Dimension **Dale's Cone**

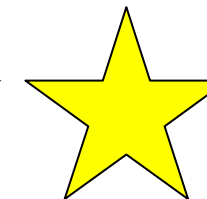
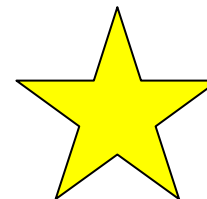
Student Learning Outcomes

Bloom's Cognitive Process Dimension
 Knowledge Remember Comprehension Understand Application Apply Analysis Analyze Synthesis Evaluate Evaluate Create

F. Identify, analyze, and solve technical problems.

- ✓ Factual Knowledge: Active
- ✓ Conceptual Knowledge:
- ✓ Procedural Knowledge:
- ✓ Meta-cognitive Knowledge:

8. To integrate mathematics, the sciences, communication, management, technical, technological knowledge and skills to accomplish team and project objectives.
a. design a vehicle to technical specifications
b. build the vehicle to technical specifications
c. solve technical problems associated with design, construction, and evaluation
d. test, evaluate vehicle against technical specifications.

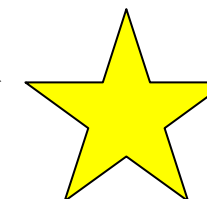
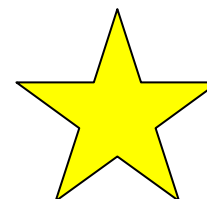


Gen Ed Goals - Students:
b. develop an ability to use modes of inquiry across a variety of disciplines in the humanities and the arts, the physical sciences and mathematics, and social sciences.
b.iv. demonstrate an ability to use scientific methods and theories to understand the phenomena studied in the natural and social sciences.

G. Communicate effectively in writing.

- ✓ Factual Knowledge: Active
- ✓ Conceptual Knowledge:
- ✓ Procedural Knowledge:
- ✓ Meta-cognitive Knowledge:

9. To design, develop, prepare, and deliver
a. executive team presentation
b. team portfolio
c. team website



NIU Gen Ed Goals- Students:
a. develop habits of writing, speaking, and reasoning necessary for continued learning.
a.i. communicate clearly in written English, demonstrating ability to comprehend, analyze, and interrogate critically.

**ABET/TAC/NAIT
Engineering & Technology**

Bloom's Knowledge Dimension **Dale's Cone**

Student Learning Outcomes

Bloom's Cognitive Process Dimension
 Knowledge Remember Comprehension Understand Application Apply Analysis Analyze Synthesis Evaluate Evaluate Create

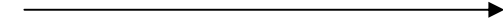
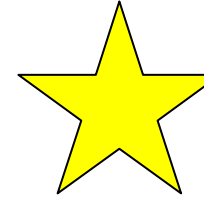
H. Communicate effectively orally.

NIU Gen Ed Goals - Students:
a. develop habits of writing, speaking, and reasoning necessary for continued learning.
a.i. communicate clearly in written English, demonstrating ability to comprehend, analyze, and interrogate critically.
aii. communicate in a manner that unites theory, criticism, and practice in speaking & writing.

- ✓ Factual Knowledge: Active
- ✓ Conceptual Knowledge:
- ✓ Procedural Knowledge:
- ✓ Meta-cognitive Knowledge:

7. To demonstrate effective project
a. planning
b. initiation
c. execution
d. termination

9. To design, develop, prepare, and deliver
a. team presentation
b. team portfolio
c. team website



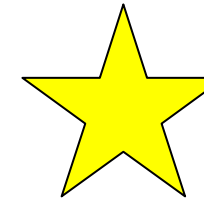
I. Recognize the need for, and an ability to engage in life long learning.

NIU Gen Ed Goals - Students:
a.iv. are able to access and use various information sources. Internet, text, and field case.

- ✓ Factual Knowledge: Intermediate
- ✓ Conceptual Knowledge:
- Procedural Knowledge:
- Meta-cognitive Knowledge:

1. To identify and describe major problems, issues, concerns, and solutions that relate to projects, project management, project teams, and project leaders, including international projects and multi-cultural teams.

2. To identify and describe best practices for managing projects and leading teams, including international projects and multi-cultural teams.

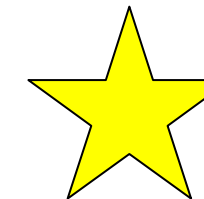


J. Understand professional, ethical, and social responsibilities.

NIU Gen Ed Goals - Students:
d. develop social responsibility and preparation for citizenship through global awareness, environmental sensitivity, and an appreciation of cultural diversity.

- ✓ Factual Knowledge: Active
- ✓ Conceptual Knowledge:
- ✓ Procedural Knowledge:
- ✓ Meta-cognitive Knowledge:

5. To exhibit leadership by engaging in a team community service project.



**ABET/TAC/NAIT
Engineering & Technology**

**Bloom's Knowledge Dimension
Dale's Cone**

Student Learning Outcomes

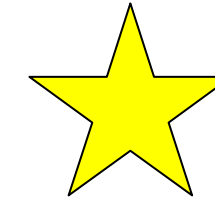
Bloom's Cognitive Process Dimension

Knowledge Remember Comprehension Understand Application Apply Analysis Analyze Synthesis Evaluate Evaluate Create

K. Respect for diversity and a knowledge of contemporary professional, societal, and global issues.

√Factual Knowledge: Active
√Conceptual Knowledge:
√Procedural Knowledge:
√Meta-cognitive Knowledge:

**3. To perform effectively on a project team (multicultural when possible).
a. To engage in conflict resolution to resolve team issues.**

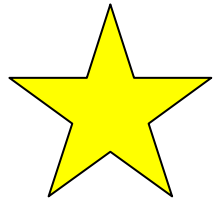
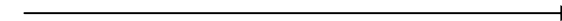


**NIU Gen Ed Goals - Students:
d. develop social responsibility and preparation for citizenship through global awareness, environmental sensitivity, and an appreciation of cultural diversity.**

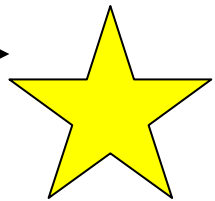
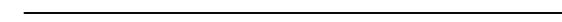
L. Commitment to quality, timeliness, and continuous improvement.

√Factual Knowledge: Active
√Conceptual Knowledge:
√Procedural Knowledge:
√Meta-cognitive Knowledge:

**6. To demonstrate effective project
a. planning
b. initiation
c. execution
d. termination
3. To perform effectively on a project team (multicultural when possible)
a. To engage in conflict resolution to resolve team issues.**



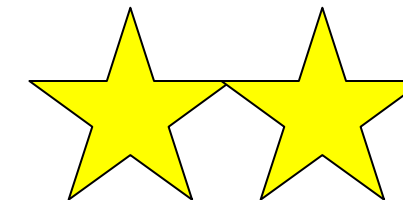
**8. To integrate mathematics, the sciences communication, management, technical and team and project objectives.
a. design a vehicle to technical specifications
b. build the vehicle to technical specifications
c. solve technical problems associated with project design, construction, and evaluation
d. test and evaluate vehicle against technical specifications**



M. Ability to program computers and/or utilize computer applications effectively.

√Factual Knowledge: Active
√Conceptual Knowledge:
√Procedural Knowledge:
√Meta-Cognitive Knowledge:

**6. To demonstrate effective project
a. planning
b. initiation
c. execution
d. termination**



**ABET/TAC/NAIT
Engineering & Technology**

Bloom's Knowledge Dimension **Dale's Cone**

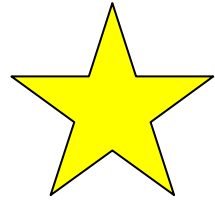
Student Learning Outcomes

Bloom's Cognitive Process Dimension
 Knowledge Comprehension Application Analysis Synthesis Evaluate
 Remember Understand Apply Analyze Evaluate Create

N. Ability to use modern laboratory techniques, skills, and/or equipment effectively.

√Factual Knowledge: Active
 √Conceptual Knowledge:
 √Procedural Knowledge:
 √Meta-Cognitive Knowledge:

8. To integrate mathematics, the sciences communication, management, technical and technological knowledge and skills to accomplish team and project objectives.
a. design a vehicle to technical specifications
b. build the vehicle to technical specifications
c. solve technical problems associated with project design, construction, and evaluation
d. test and evaluate vehicle against technical specifications



**ABET/TAC/NAIT
Engineering & Technology**

O. Ability to manage projects effectively.

NIU Gen Ed Goals - Students:
c. develop an understanding of the interrelatedness of various disciplines by integrating knowledge from several disciplines and applying that knowledge to an understanding of important problems and issues.

| Bloom's Knowledge Dimension | Dale's Cone | Student Learning Outcomes | Bloom's Cognitive Process Dimension | | | | | |
|---|-------------|---|-------------------------------------|--------------------------|-------------------|------------------|--------------------|-----------------|
| | | | Knowledge Remember | Comprehension Understand | Application Apply | Analysis Analyze | Synthesis Evaluate | Evaluate Create |
| √Factual Knowledge: √Conceptual Knowledge: √Procedural Knowledge: √Meta-cognitive Knowledge: | Active | 1. To identify and describe major problems, issues, concerns, and solutions that relate to projects, Pmanagement, P teams and P leaders, including international projects and leading multicultural teams. | ★ | | | | | ★ |
| | | 2. To identify and describe best practices for managing projects and leading teams, including international projects and multicultural teams. | | | | | | |
| | | 3. To perform effectively on a project team (multicultural team when possible). | | | | | | |
| | | 4. To prepare the team for project work by a. developing a team operations manual b. developing a peer and team assessment system c. creating the team organization and process d. developing a team project plan | ★ | | | | | ★ |
| | Active | 6. To demonstrate project a. planning b. initiation c. execution d. termination e. problem solving | | | | | | ★ |
| | | 7. To demonstrate effective use of project management techniques and tools in the management of a technical project. a. the development of a project plan b. use of MS Project c. use of appropriate financial planning and operations procedures d. use of appropriate procurement procedures e. scheduling techniques f. use of the MACE process | | | | | ★ | |
| | | 9. To design, develop, prepare, and deliver a. executive team presentation b. team portfolio c. team website | ★ | | | | | ★ |

**ABET/TAC/NAIT
Engineering & Technology**

**Bloom's Knowledge Dimension
Dale's Cone**

Student Learning Outcomes

Bloom's Cognitive Process Dimension
 Knowledge Remember Comprehension Understand Application Apply Analysis Analyze Synthesis Evaluate Evaluate Create

P. Ability to design, manipulate, and manage industrial systems.

Factual Knowledge:

NA

Conceptual Knowledge:

Procedural Knowledge:

Meta-cognitive Knowledge:

NIU Gen Ed Goals - Students:
c. develop an understanding of the interrelatedness of various disciplines by integrating knowledge from several disciplines and applying that knowledge to an understanding of important problems and

Q. Ability to manage or lead personnel effectively.

√Factual Knowledge: Active

3. To perform effectively on a project team (multicultural when possible).

√Conceptual Knowledge:

a. To engage in conflict resolution to resolve team issues.

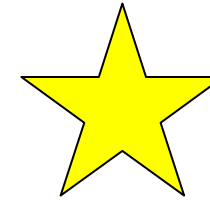
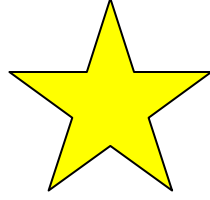
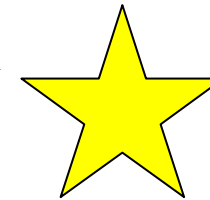
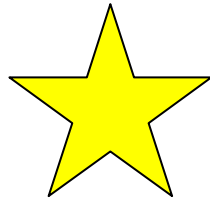
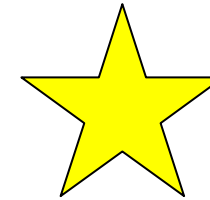
√Procedural Knowledge:

b. To engage in the leadership of the team, team members, or work package sub-team members.

√Meta-cognitive Knowledge:

4. The team will prepare project work by
a. developing a team operations manual
b. developing a peer and team assessment system
c. creating the team organization and process
d. developing a team project plan

5. To exhibit leadership while engaged in a team community service project
a. plan
b. initiate
c. execute
d. terminate
e. report



Note: additional educational outcomes articulated by the overall program ** See in text boxes above - NIU General Education Goals