



# ENEC12011 *Transport Systems*

## Term 2 - 2024

Profile information current as at 29/07/2024 03:11 pm

All details in this unit profile for ENEC12011 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

## General Information

### Overview

In this unit, you will be introduced to the design of roads, pavements, and associated documentation. You will also be introduced to traffic analysis, safety, efficiency, environmental and cultural issues, and the sustainability of road and pavement design. You will analyse traffic survey data and interpret survey results, applying them to the analysis of traffic flows and estimation of system capacity. You will also apply design codes and manuals to common design problems involving the geometric design of roads, road drainage, intersection design, and pavement design and rehabilitation. You will learn to work with the most common software in road and pavement design to prepare plans, design alignments, compile specifications, design pavement, and estimate quantities and costs.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

Prerequisites: [ENEC12009 Engineering Surveying or ENAR12005 Surveying and Mapping] and [MATH11218 Applied Mathematics or MATH11160 Technology Mathematics].

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

### Offerings For Term 2 - 2024

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- Rockhampton

### Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

### Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

## Class and Assessment Overview

### Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

#### [Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

1. **Report**

Weighting: 30%

2. **Report**

Weighting: 40%

3. **Online Quiz(zes)**

Weighting: 30%

### Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

## CQUniversity Policies

**All University policies are available on the [CQUniversity Policy site](#).**

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

## Previous Student Feedback

### Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

#### Feedback from Email

**Feedback**

The updated guidelines taught in this unit were beneficial to support learning.

**Recommendation**

The unit contents and all other resources and assessment tasks should be updated to follow the latest version of guidelines/standards.

#### Feedback from Email and Moodle

**Feedback**

The software taught in this unit was beneficial in supporting learning, while more examples and explanations in the workshop sessions are suggested.

**Recommendation**

More examples should be discussed during the workshop sessions for a better understanding of the software.

#### Feedback from Email

**Feedback**

The staff had the good technical knowledge, and the lecturer was really helpful through quick and comprehensive responses.

**Recommendation**

The same quality of support should be maintained in future offerings.

## Unit Learning Outcomes

### On successful completion of this unit, you will be able to:

1. Organise and conduct traffic surveys, analyse collected data and interpret the results
2. Apply standard techniques to forecasting future traffic demand
3. Design and document geometric alignments of transportation infrastructure using appropriate Australian guidelines
4. Evaluate the pavement sublayer materials properties using appropriate Australian guidelines
5. Design a basic road pavement using appropriate Australian guidelines
6. Demonstrate a professional level of communication using appropriate engineering language.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

#### Introductory

2.3 Application of systematic engineering synthesis and design processes. (LO: 3N 4N 5N)

2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 4N 5N)

3.1 Ethical conduct and professional accountability. (LO: 6N)

3.4 Professional use and management of information. (LO: 1N 3N 4N 5N)

3.6 Effective team membership and team leadership. (LO: 3N 5N)

#### Intermediate

1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1I 2N 3I 4N 5I)

1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2N 3I 4N 5I 6N)

1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 2N 3I 4I 5I 6N)

1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1I 3I 4N 5N)

1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 2N 3I 4I 5I)

3.2 Effective oral and written communication in professional and lay domains. (LO: 1I 2N 3I 4N 5I 6N)

#### Advanced

1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1A 2N 3I 4N 5I)

2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1N 2N 3I 4N 5A)

2.2 Fluent application of engineering techniques, tools, and resources. (LO: 1I 3I 4I 5A)

**Note:** LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information

<https://moodle.cqu.edu.au/course/view.php?id=1511>

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Report - 30%	•	•				•
2 - Report - 40%			•	•	•	•
3 - Online Quiz(zes) - 30%		•	•	•	•	

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Communication	•		•		•	•
2 - Problem Solving		•		•		
3 - Critical Thinking	•	•	•	•	•	
4 - Information Literacy	•	•	•	•	•	
5 - Team Work						
6 - Information Technology Competence	•	•	•		•	•
7 - Cross Cultural Competence			•			
8 - Ethical practice	•	•	•	•	•	•
9 - Social Innovation						
10 - Aboriginal and Torres Strait Islander Cultures						

## Textbooks and Resources

### Textbooks

ENEC12011

#### Prescribed

#### **MASTERING AUTOCAD CIVIL 3D: AUTODESK OFFICIAL PRESS: 2016**

1ST EDITION (2015)

Authors: Davenport & Voiculescu

John Wiley and Sons

Hoboken , NJ , USA

ISBN: 9781119059745

Binding: Paperback

ENEC12011

#### Prescribed

#### **TRAFFIC AND HIGHWAY ENGINEERING**

Fifth edition (2019)

Authors: Nicholas J Garber , Lester A Hoel

Cengage Learning

ISBN: 9781337631044

Binding: Paperback

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- AutoCAD Civil 3D
- Pavement Design Software CIRCLY

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Farzaneh Tahmoorian** Unit Coordinator

[f.tahmoorian@cqu.edu.au](mailto:f.tahmoorian@cqu.edu.au)

## Schedule

### **Introduction to Transportation Engineering - 08 Jul 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Basic Concept of Traffic and Highway Engineering Transportation Systems	1. Chapters 1 and 2 in Traffic & Highway Engineering (Garber & Hoel)	

### **Traffic Engineering Studies - 15 Jul 2024**

Module/Topic	Chapter	Events and Submissions/Topic
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Main Components of Highway Mode Traffic Studies	1. Chapters 3 and 4 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapter 2 in AGTM03-17
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**Traffic Surveys and Analysis - 22 Jul 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Traffic Surveys Principles of Traffic Flow	1. Chapters 4 and 6 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapter 2 in AGTM03-17	

**Travel Demand Forecasting - 29 Jul 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Basic Elements of Transportation Planning Demand Forecasting Approaches Understanding the AutoCAD Civil 3D User Interface	1. Chapters 12 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapter 1 in Mastering AutoCAD Civil 3D (2016)	Online Quiz 1 (Open from 2 August 2024, Due by 9 August 2024 at 11.59 pm AEST).

**Geometric Design 1: Fundamentals and Design Objectives - 05 Aug 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Fundamental Considerations in Road Design Road Network Classification Geometric Design of Highway Facilities Understanding the AutoCAD Civil 3D User Interface	1. Chapters 15 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapters 2 and 3 in AGRD03-16 3. Chapter 1 in Mastering AutoCAD Civil 3D (2016)	<b>Traffic Engineering</b> Due: Week 5 Friday (9 Aug 2024) 11:59 pm AEST

**Vacation Week - 12 Aug 2024**

Module/Topic	Chapter	Events and Submissions/Topic

**Geometric Design 2: Cross Section and Sight Distances - 19 Aug 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Cross Section Sight Distances Alignments in AutoCAD Civil 3D	1. Chapters 15 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapters 4 and 5 in AGRD03-16 3. Chapter 6 in Mastering AutoCAD Civil 3D (2016)	

**Geometric Design 3: Horizontal Alignment - 26 Aug 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Design of the Horizontal Alignment Profiles in AutoCAD Civil 3D	1. Chapters 15 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapters 7 in AGRD03-16 3. Chapter 6 in Mastering AutoCAD Civil 3D (2016)	

**Geometric Design 4: Vertical Alignment - 02 Sep 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Design of the Vertical Alignment Assemblies in AutoCAD Civil 3D	1. Chapters 15 in Traffic & Highway Engineering (Garber & Hoel) 2. Chapters 8 in AGRD03-16 3. Chapter 7 in Mastering AutoCAD Civil 3D (2016)	Online Quiz 2 (Open from 6 September 2024, Due by 13 September 2024 at 11.59 pm AEST).

**Pavement Design 1: Materials and Design Traffic - 09 Sep 2024**

Module/Topic	Chapter	Events and Submissions/Topic

Pavement Types	1. Chapters 2 and 6 in AGPT02-17
Pavement Materials	2. Chapter 6 in TMR Supplement Guide (2018)
Pavement Design Traffic Corridors in AutoCAD Civil 3D	3. Chapter 7 in Mastering AutoCAD Civil 3D (2016)

#### **Pavement Design 2: Pavement Design - 16 Sep 2024**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Pavement Design Traffic Flexible Pavement Design Pavement Design Software CIRCLY	1. Chapter 7 in AGPT02-17 2. Chapter 7 in TMR Supplement Guide (2018) 3. Chapter 9 in Mastering AutoCAD Civil 3D (2016)	

#### **Pavement Design 3: Design of Flexible pavements - 23 Sep 2024**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Flexible Pavement Design Pavement Design Software CIRCLY	1. Chapter 8 in AGPT02-17 2. Chapter 8 in TMR Supplement Guide (2018)	

#### **Pavement Design 4: Design of Rigid Pavement - 30 Sep 2024**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Rigid Pavement Design	1. Chapter 9 in AGPT02-17 2. Chapter 9 in TMR Supplement Guide (2018)	Online Quiz 3 (Open from 11 October 2024, Due by 18 October 2024 at 11.59 pm AEST).  <b>Geometric and Pavement Design</b> Due: Week 12 Friday (4 Oct 2024) 11:59 pm AEST

#### **Review/Exam Week - 07 Oct 2024**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>

#### **Exam Week - 14 Oct 2024**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>

## Assessment Tasks

### 1 Traffic Engineering

#### **Assessment Type**

Report

#### **Task Description**

This assessment task requires students to demonstrate their understanding of various concepts and theories taught in this unit for traffic engineering and traffic studies analysis. In this assignment, students need to analyse a traffic survey known as a spot speed survey. Spot speed studies are conducted to estimate the distribution of vehicle speeds in a stream of traffic at a specific location. For this assignment, a spot speed study was carried out by recording the speeds of a sample of vehicles at Fitzgerald Street in the Norville suburb of Bundaberg, close to Shalom Catholic College. The report template and detailed requirements are available on Moodle under the Assessment tile.

**All students must submit their reports individually for this assessment.**

#### **Assessment Due Date**

Week 5 Friday (9 Aug 2024) 11:59 pm AEST



**Return Date to Students**

Week 6 Friday (23 Aug 2024)

**Weighting**

30%

**Minimum mark or grade**

50% of Traffic Engineering Report marks

**Assessment Criteria**

This assessment will be assessed for the:

- Accuracy of the Input parameter for each computation step with an appropriate unit;
- Application of accurate methodology with appropriate referencing. Full mark will only be awarded for error-free computational steps with proper explanation to be understood by an independent person;
- Accuracy of the answer with the appropriate unit;
- If answers to any preceding steps are inaccurate. A partial mark is awarded for subsequent answers;
- Reference to proper standards and guidelines;
- Correct application of mathematics and arithmetic;
- Clearly identified answers; and
- Correct results.

In addition, the assessment as a whole will be assessed against the following criteria:

- Evidence of correct procedures;
- All necessary steps in the analysis are present in the correct order;
- A clear presentation of the mathematical and arithmetical working linking is given;
- Details of the problem with the results are obtained; and
- Evidence of checking results (mathematical, graphical, logical common sense) are presented;
- Evidence of an understanding of the topic:

1. Explanation of choices made in the analysis (why is the procedure required, why this particular procedure); and
2. Interpretation of results
3. Professional presentation

- Professional presentation

1. Clear presentation of problem, data, analysis
2. A clear statement of each problem and its details and requirements
3. The logical layout of analysis
4. Appropriate use of diagrams
5. Correct use of terminology and conventions
6. Clear English in the explanation of procedure and interpretation of results

***A similarity check will always be done before marking the submitted assignments for all students. Upon detection of any plagiarism, including i) similarity between submitted reports within the same cohort or ii) with the previous cohorts or iii) submitted works to other institutes or iv) using the material provided by cheating websites will result in failing that assignment without marking, and the student will be reported to the CQU Academic Misconduct team for further actions.***

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

### **Submission Instructions**

The submission should be in a single PDF document. Any spreadsheet, software output, or Excel graphs must be transferred to the main PDF document. See Moodle for more detail and description.

### **Learning Outcomes Assessed**

- Organise and conduct traffic surveys, analyse collected data and interpret the results
- Apply standard techniques to forecasting future traffic demand
- Demonstrate a professional level of communication using appropriate engineering language.

## **2 Geometric and Pavement Design**

### **Assessment Type**

Report

### **Task Description**

The purpose of this assessment task is to enable students to showcase their comprehension of different concepts and theories taught in the course for geometric design and pavement design of roads using Civil3D and CIRCLY, following Australian standards. The Geometric and Pavement Design report must be created and submitted as a team. The report template and specific requirements will be accessible on Moodle under the Assessment section in Week 4.

### **Assessment Due Date**

Week 12 Friday (4 Oct 2024) 11:59 pm AEST

### **Return Date to Students**

After the final grade release

### **Weighting**

40%

### **Minimum mark or grade**

50% of Geometric and Pavement Design report marks

### **Assessment Criteria**

This assessment will be assessed for the:

- Accuracy of the Input parameter for each computation step with an appropriate unit;
- Application of accurate methodology with appropriate referencing. Full mark will only be awarded for error-free computational steps with proper explanation to be understood by an independent person;
- Accuracy of the answer with the appropriate unit;
- If answers to any preceding steps are inaccurate. A partial mark is awarded for subsequent answers;
- Reference to proper standards and guidelines;
- Correct application of mathematics and arithmetic;
- Clearly identified answers; and
- Correct results.

In addition, the assessment as a whole will be assessed against the following criteria:

- Evidence of correct procedures;
  - All necessary steps in the analysis are present in the correct order;
  - A clear presentation of the mathematical and arithmetical working linking is given;
  - Details of the problem with the results are obtained; and
  - Evidence of checking results (mathematical, graphical, logical common sense) are presented;
  - Evidence of an understanding of the topic:
1. Explanation of choices made in the analysis (why is the procedure required, why this particular procedure); and
  2. Interpretation of results
  3. Professional presentation
- Professional presentation

1. Clear presentation of problem, data, analysis
2. A clear statement of each problem and its details and requirements
3. The logical layout of analysis
4. Appropriate use of diagrams
5. Correct use of terminology and conventions
6. Clear English in the explanation of procedure and interpretation of results

***A similarity check will always be done before marking the submitted assignments for all students. Upon detection of any plagiarism, including i) similarity between submitted reports within the same cohort or ii) with the previous cohorts or iii) submitted works to other institutes or iv) using the material provided by cheating websites will result in failing that assignment without marking, and the student will be reported to the CQU Academic Misconduct team for further actions.***

#### **Referencing Style**

- [Harvard \(author-date\)](#)

#### **Submission**

Online Group

#### **Submission Instructions**

The submission should be in a single PDF document. Any spreadsheet, software output, or Excel graphs must be transferred to the main PDF document. See Moodle for more detail and description.

#### **Learning Outcomes Assessed**

- Design and document geometric alignments of transportation infrastructure using appropriate Australian guidelines
- Evaluate the pavement sublayer materials properties using appropriate Australian guidelines
- Design a basic road pavement using appropriate Australian guidelines
- Demonstrate a professional level of communication using appropriate engineering language.

## **3 Progressive Tests**

#### **Assessment Type**

Online Quiz(zes)

#### **Task Description**

This assessment task consists of three Progressive Tests in the form of online Quizzes. Each test consists of 5 to 7 numerical questions.

#### **Important Notes:**

- Each test is set for 60 minutes. You have 60 minutes from when you start your attempt to submit your answers. If you start but leave a test and come back to it later, your 60 min time may have lapsed, and you will be scored zero for that attempt.
- You can attempt the quiz up to 2 times within the given timeframe (generally one week) specified in the schedule. The test will be automatically closed after the end of the given timeframe.
- The final mark will be the highest of all the attempts.
- Even though the tests are open for a few days, it is expected that your first attempt would be on the first day.
- Tests can not be deferred.

#### **Number of Quizzes**

3

#### **Frequency of Quizzes**

Other

**Assessment Due Date**

Please see the schedule in the Unit Profile.

**Return Date to Students**

Immediately after the test.

**Weighting**

30%

**Assessment Criteria**

Due to the nature of the assessment, only the final answer will be considered. Full marks will be given for each correct answers. There will be no partial marks.

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- Apply standard techniques to forecasting future traffic demand
- Design and document geometric alignments of transportation infrastructure using appropriate Australian guidelines
- Evaluate the pavement sublayer materials properties using appropriate Australian guidelines
- Design a basic road pavement using appropriate Australian guidelines

## Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

### What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

### Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

### Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

### What can you do to act with integrity?



#### Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



#### Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



#### Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem