ETSI Pedagogy Syllabus

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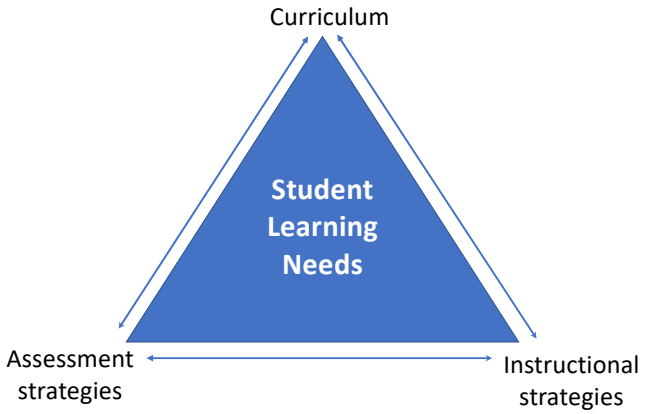
Course Overview: This course is designed around the three overarching areas: knowing students, supporting students, and designing meaningful lessons for students. We first review how people learn, distinguish between teachers' *mindsets* about student learning (fixed versus growth), and how teachers can support student *metacognition* (awareness of their own learning). Each year we will then explore various topics related to knowing students (prior conceptions, assessing students, *socioscientific issues* that engage students), supporting learning (teaching around *inquiry*, pedagogical strategies, and adapting existing lessons plans), and designing curricula (*lesson plans, unit plans, and assessment tools*). Each year monastic students will create instructional materials for a culminating unit plan.* italicized terms are defined at the end of the syllabus.

Student Learning Objectives: After this course, students will be able to:

- Describe learning theories and how these impact our instructional and assessment choices
- Describe and implement various instructional and assessment strategies
- Create instructional materials to support an inquiry mindset to increase scientific understanding.

The following diagram illustrates that all three traditional aspects of pedagogy courses (curriculum, instructional strategies, and assessment) will be explored by continually considering the needs of students (their prior knowledge, their cultural/social/personal backgrounds, their educational background, and the local/social context in which the course is taught). Hence, the following diagram will be considered in the context of "what is culturally relevant" and how can instructors' relate to students' interests and worldviews.



Schedule

Year	Topic	Student products
1	**How people learn** • Behaviorist versus constructivist models • *Growth versus fixed mindset* about how people learn • Promoting *metacognition*	Inquiry-based lesson plan using the combined Understanding by Design (UbD)-Inquiry (5E) template. Monastic students will be asked to consider the Five Instructional Elements (*Purpose, Synopsis, Connection/ Transitioning, Defense, and Definition*), which is part of their dialectical training, and how these overlap with inquiry-based lesson plans.
	Knowing our students • Prior (alternative) conceptions • Potentially conflicting conceptions (various worldviews) • *Socio-scientific issues (SSIs)* that matter to students	
	Supporting student learning • Teaching for an *inquiry* mindset • Teaching *post-positivist* science as a *constructivist* teacher • Pedagogical strategies (e.g., lecture, small group work, writing-to-learn, drawing-to-learn) • Culturally relevant/responsive pedagogy	
	Designing inquiry-based lesson plans • *Understanding by Design (UbD)* model • *5E Inquiry-based model*	
2	**Knowing our students** • Designing formative assessments • SSIs that matter to students	SSI Inquiry-based lesson plan using the combined UbD-5E template.
	Supporting student learning • Pedagogical strategies (e.g., stations, reading-to-learn, *cooperative jigsaw*, storytelling) • Adapting existing lessons (scaling, modifying)	
	Designing inquiry-based lesson plans • SSI lesson plans • Continue UbD/5E lesson planning	
3	**Knowing our students/ supporting learning** • *Assessment* versus *evaluations*	

	• Summative assessments • Peer-evaluation, Self-evaluation, and Instructor evaluation	Unit Plan with at least three lesson plans (one which should center on an SSI).
	Supporting student learning • How an inquiry mindset supports research mindset • Pedagogical strategies (e.g., connecting theory to practice: lecture to lab, creating models, debate, student presentations)	
	Designing inquiry-based unit plans • Creating a unit from multiple lessons	

Terminology (alphabetical order)

- *Assessment tools:* Assessments are tools that help the student and the teacher gauge how well the student has mastered both content knowledge (e.g., describing what a neuron is) and skills (e.g., reading graphs). Assessments can be ungraded (informal), such as during classroom discussions, or they can be graded (e.g., quiz), often given at end of lessons or units. Assessments should be administered throughout lessons and units. Those given at the beginning or during lesson are formative assessments (e.g., homework assignments) and inform both the students and the teacher where students are struggling to master content and/or skills. At the end of units, summative assessments (e.g., final exam) help teachers and students measure students' final content knowledge and competencies.
- *Constructivist Teacher:* This teacher adheres the philosophy that his/her students do not share one perception of reality. This teacher recognizes that all students learn in diverse ways and that they draw on their personal experiences to make sense of course content. If a constructivist teacher is teaching natural science, they must recognize that post-positivism has dominated most of academic ("western") science and they can use diverse instructional strategies to discuss inductive and deductive reasoning that are core to post-positivist scientific research.
- *Cooperative Jigsaw Activity:* Jigsaw activities are cooperative lessons that divide a final task into parts. Each student must complete their assigned activity for the entire group to complete their task. These activities allow students to apply content knowledge and skills that they have acquired throughout the class. Final (summative) assessments may be of the group work or of individual's understanding of the final group project.
- *Inquiry Lesson:* Inquiry lessons are designed to help students ask questions and take ownership of the content being explored. These lessons often solicit student questions about a phenomenon. These may be large-scale, lofty questions that are challenging to answer in a class setting (e.g., is climate change affecting our monastic community), and the teacher will guide students to reframe questions, so they can be answered within the context of the class (e.g., how do increased temperatures affect the growth rate of bean plants?).

- *Lesson Plan:* A lesson plan typically describes how a teacher plans to help students meet identified learning objectives. The lesson plan often covers 1-2 days of classroom activities/instruction.
    - The *5E lesson plan template* was designed to help teachers help students take ownership of their learning through inquiry activities. The 5E's are Engage, Explore, Explain, Elaborate, and Evaluate. Both teacher and students are involved in all five stages. The goal of this lesson plan format is to ensure that teachers do not begin any lesson with lectures, but rather that they allow students to identify their prior knowledge of the content matter.
- *Mindsets:* Instructors with *fixed mindsets* believe that students are unable to shift how they learn or how much they learn, while instructors with *growth mindsets* believe that all students have the potential to shift how they learn and how much they learn
- *Metacognition* refers to being aware of one's own ability to learn and how we learn. We can promote metacognition through reflective practices (e.g., asking students to evaluate their own work).
- *Post-Positivist teacher:* This teacher adheres to the philosophy that there is one reality that can be measured using accepted methodologies that allow people to repeat studies and learn by falsifying (not verifying) hypotheses. This teacher often assumes that all students are capable of learning using the same strategies.
- *Socioscientific Issues:* Often referred to as SSIs, socioscientific issues are those for which students and teachers bring multiple sources of knowledge to understand. There are no right or wrong answers or solutions to SSIs, but an understanding of natural sciences is needed to engage in holistic reasoning of the topic. Introducing topics as SSIs has been shown to engage students because they see the immediate relevancy of the content they are learning in their science classrooms (e.g., studying Genetically Modified Organisms during a unit on genetics or studying alternative forms of energy in a physics class).
- *Unit Plan:* Unit plans typically describe how a teacher plans to help students meet several student learning objectives. Often a few to several lesson plans collectively comprise a unit plan. For example, a unit plan on "the human body," may be made up of individual lessons that explore individual organ systems (respiratory, digestive, nervous, etc.).
    - The *Understanding by Design (UbD) unit plan template* is divided into three parts: learning objectives, student performance assessment, and learning plan. The goal of this unit plan template is for teachers to identify the assessment before they design each lesson plan. The reason for this design to ensure that assessments and classroom instructional design are aligned. Very often, teachers design their assessments (e.g., homework, exams, papers) after the lesson has been taught.