Texas A&M Engineering x Arts et Métiers
AM2 – Virtual to In Person
Workshop 2

June 15, 2021

Project Leaders

Dr. Regis Kubler – Arts et Métiers

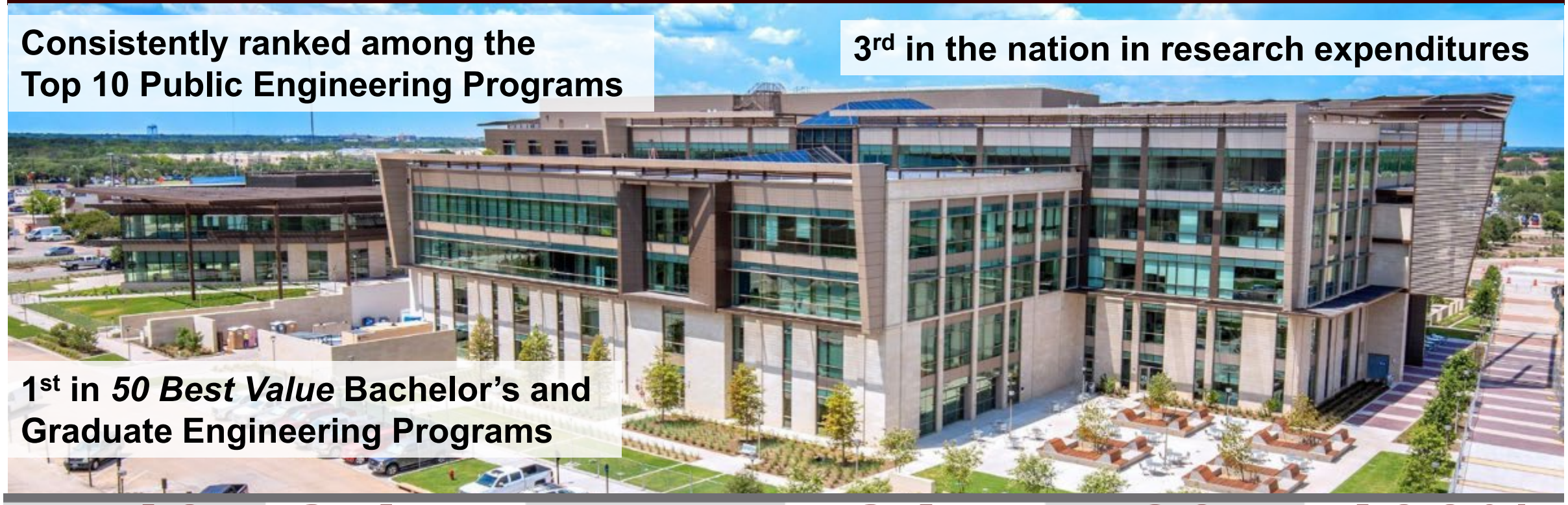
- Associate Professor Mechanics, Surface and Material Processing
- Leading the Education Programs under the AM2 Partnership

Dr. Maria Alves – Texas A&M Engineering

- Senior Director for Halliburton Engineering Global Programs
- Leading the Education Programs under the AM2 Partnership

College of Engineering

TEXAS A&M UNIVERSITY
Engineering



710	2.1 MILLION	21,501	247	30	100%
FACULTY	SQUARE FEET OF LEARNING SPACE	Students	PROFESSIONAL SOCIETY FELLOWS	NATIONAL & INTERNATIONAL ACADEMY MEMBERS	OF ENGINEERING CLASSES LESS THAN 100 STUDENTS

ARTS ET METIERS A UNIQUE ENGINEERING SCHOOL WITH 8 CAMPUSES AND 3 INSTITUTES

Study Abroad Program 2019 in Aix en Provence

Campus Arts et Métiers

Instituts

Arts et Métiers Institute of Technology

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FACE Foundation Grant

French-American Cultural Exchange

Transitioning to Virtual Exchange Covid - 19 Relief Fund

- Launched by the FACE Foundation in collaboration with the French Embassy in the U.S. and the U.S. Embassy in France

- Aims at supporting French-American collaborations and preparing for the post-pandemic when international travel resumes

AM2 Partnership

- **Arts et Métiers** and **Texas A&M Engineering**, two top engineering institutions, teamed up after over 20 years of collaboration in the area of advanced manufacturing and material science, to establish the **AM² transatlantic partnership**

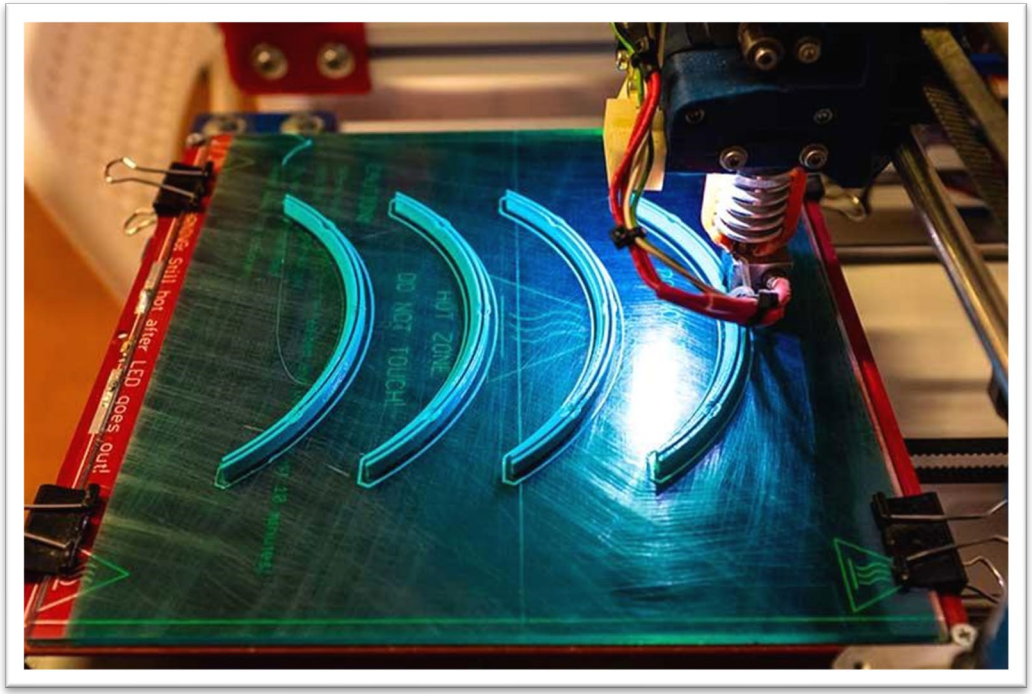
- It aims to positively impact the global manufacturing industry through extensive research collaborations, education programs, and mutual faculty and student exchange initiatives

https://www.am2.tech/

AM2 Partnership

Existing Collaborations

- AM2 Research Partnership in Smart Manufacturing
- Faculty Led Study Abroad
- Collaborative Degree
- Dual Degree



Building on

- Joint Virtual Global Engineering Design Class
- Reciprocal Exchange

Virtual to In Person

Arts et Métiers Institute of Technology

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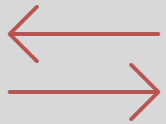

Goal: Build the infrastructure for a large and sustainable Student Exchange Program between TAMU Engineering (TAMU) and Arts et Métiers campus in Aix-en-Provence

Students: Implemented a fall semester joint virtual Global Engineering Design class

Academic advisors and faculty members: Connected academic departments to identify course equivalencies to map a semester long student exchange

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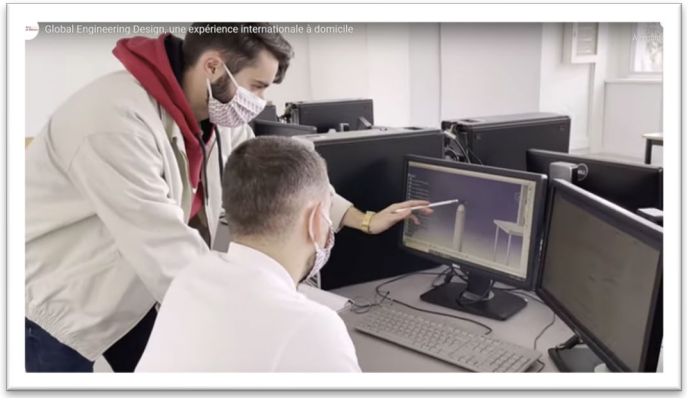
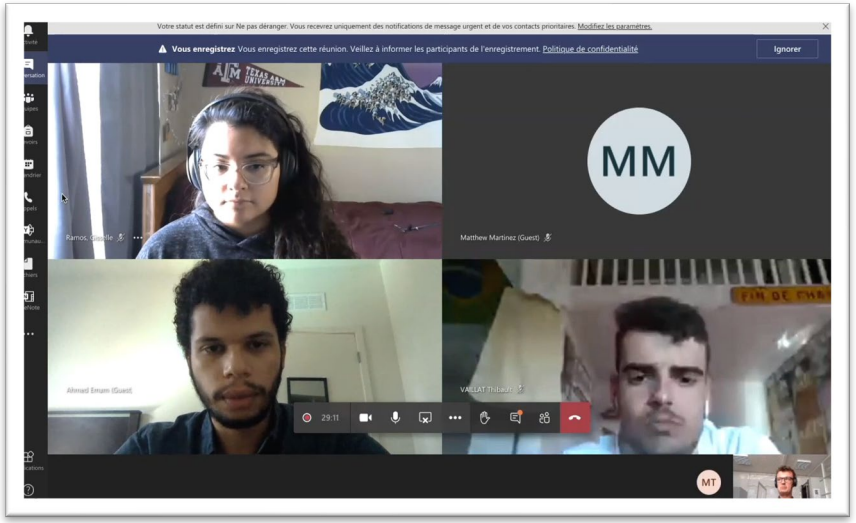
Global Virtual Engineering Design Course

Course Description

- Students carry out an engineering design project working in international teams of students, faculty and industry experts



- In addition to applying engineering skills in the project, topics also include:
  - Study and application of intercultural models
  - Global enterprise fundamentals
  - Remote collaboration technologies



Learning Outcomes

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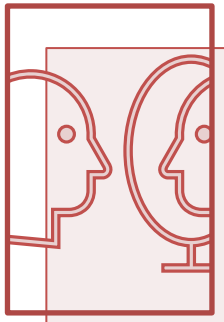
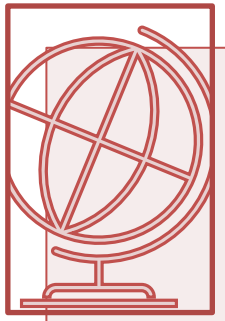
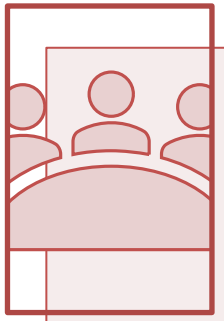
Integrate and apply skills required to solve an engineering design problem



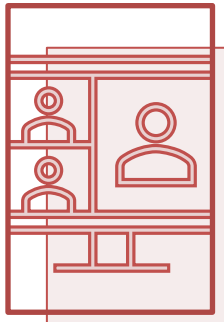
Apply intercultural knowledge for self-improvement



Identify intercultural differences and similarities, and their relevance to effectiveness in the workplace



Apply intercultural knowledge for effective teamwork



Apply synchronous and asynchronous technologies for remote and web-based collaboration

Class Schedule

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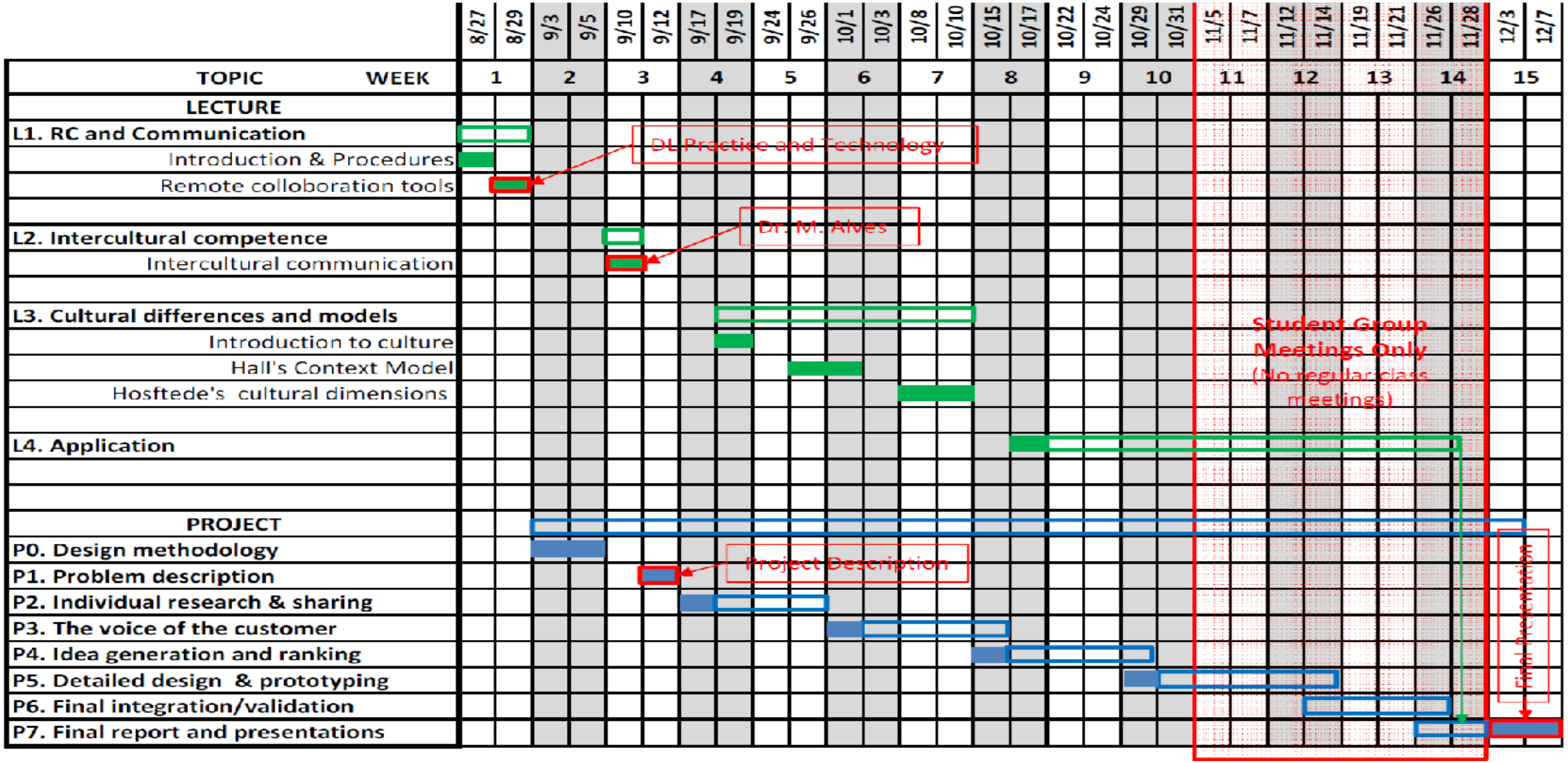

Group Projects

Student Affiliation	Student Major	Project	Project Contact	Project Description
Arts&Metiers	MEEN	E1	Regis Kubler	Development of a Power Projection Gun
TAMU	BMEN	E1		
TAMU	PETE	E1		
Arts&Metiers	MEEN	E1		
TAMU	ELEN	E1		
AUTh	MEEN	T1.1	Oswaldo Bastidas	Design a Rack Retainer
TAMU	MMET	T1.1		
TAMU	MSEN	T1.1		
TAMU	INEN	T1.1		
ADEL	REEP	T1.1		

Global Engineer

- Understand and appreciate Cultural Differences
- Different cultural groups think, feel, and act differently
- There are no scientific standards for considering one group as intrinsically superior or inferior to another
- Facts x Interpretation: We interpret facts based on our cultural values and background
- Global Competency skills will make you a more effective engineer

Activity – Direct Poll

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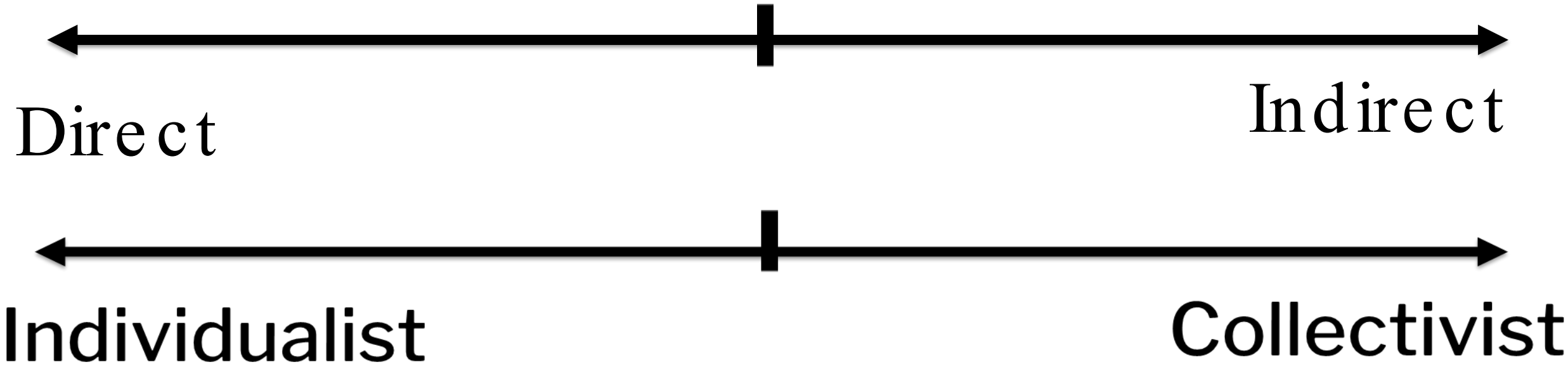
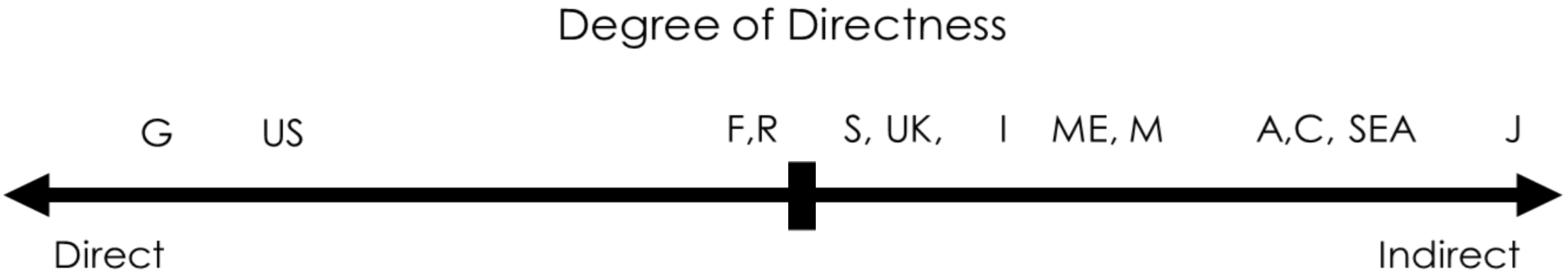
http://etc.ch/PLJE

Direct x Indirect:



Direct x Indirect:

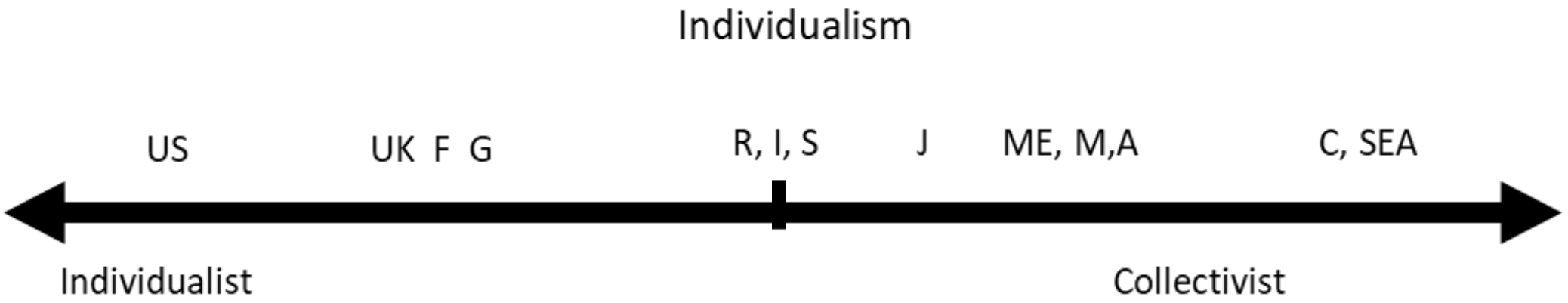


Direct

Indirect

- https://www.youtube.com/watch?v=kCIAb6hvPgY&t=31s
- https://www.youtube.com/watch?v=SJxHW6GtdbE&t=14s

Individualistic x Collectivist



Individualist

Collectivist

- https://www.youtube.com/watch?time_continue=592&v=zQj1VPNPHII
- 1.50 to 5Min

Besides self-awareness

This exercise demonstrates that we cannot stereotype cultures

Students Ambassadors

https://artsetmetiers.fr/fr/actualites/global-engineering-design-une-experience-internationale-domicile

Moving Forward

- The course will continue to be offered every Fall Semester as a **Global Experience at Home** and to build student momentum

- The virtual class helps us establish a target audience and develop ambassadors for the in-person exchanges (faculty-led, reciprocal exchange, global internship, dual degree)

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Arts Institute of Technology et Métiers

Questions about the Collaborative Virtual Class?

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Course Mapping for Curriculum Integration

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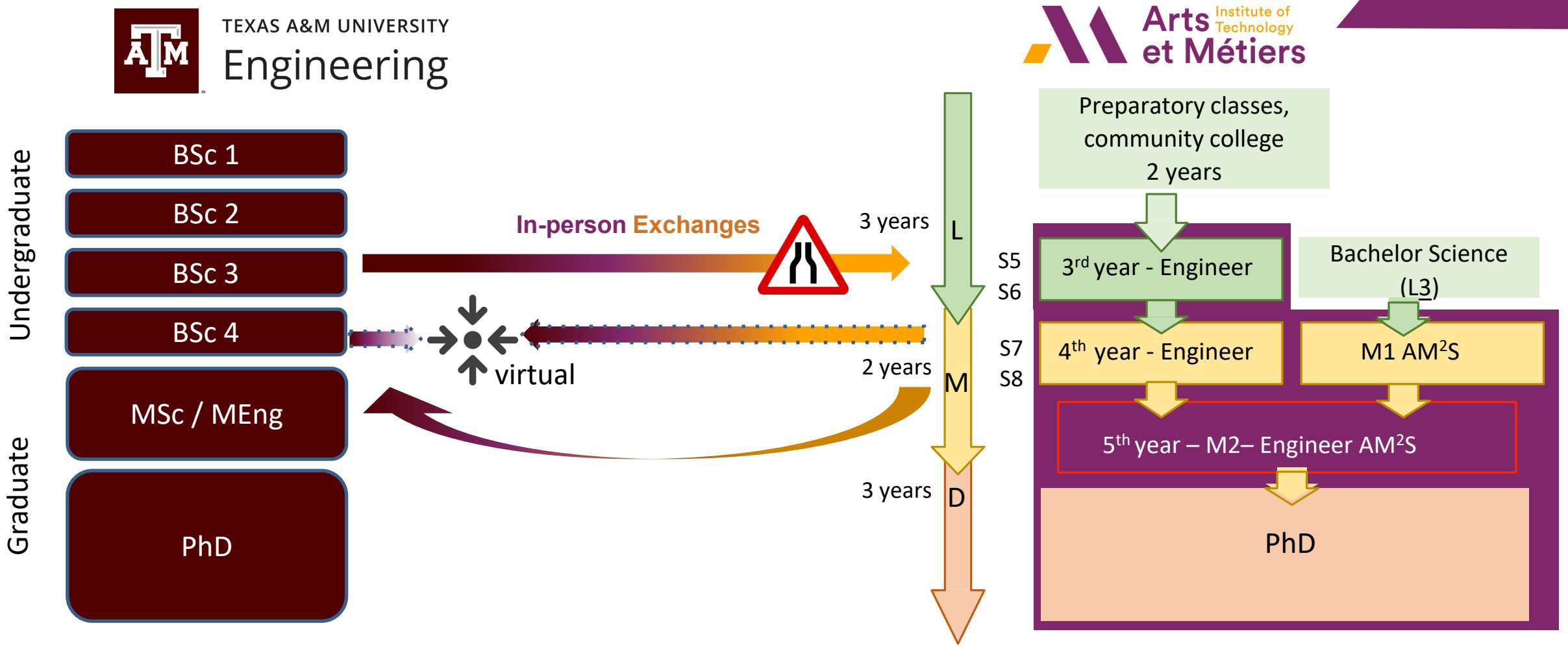
Student Exchanges between two education systems



Arts et Metiers to Texas A&M: courses have to be in the scope of the semester (mechanical engineering) addressing scientific issues and developing managerial skills (9-12 US credits, 400'-600')

Texas A&M to Arts et Metiers: courses in English required in the degree plan at Texas A&M, meeting ABET documentation requirements

Objectives

- Co-hosted faculty networking meetings for mapping courses for semester exchange (FACE grant 2020-2021, Exchange Programs 2021-2025)
- Connect academic advisors and faculty members responsible for validating course transfer and degree plan to map a semester long exchange of Texas A&M students in Aix en Provence campus
- Define the courses to be transferable to the degree plan of the students without graduation delays
- Meeting followed by individual actions on specific courses between professors and their counterparts (subject matter experts, departments)

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Timeline

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November 13 2020

TAMU internal meeting to kick off the project

December 10 2020

TAMU Arts et Métiers 1st virtual meeting (group)

Week of Dec. 14 2020

First individual major meeting

January-February 2021

Continue with individual major meetings (6 meetings)

March-April 2021

TAMU Arts et Métiers 2nd virtual meeting (group)

May 2021

Weeklong trip to France >> October 2021

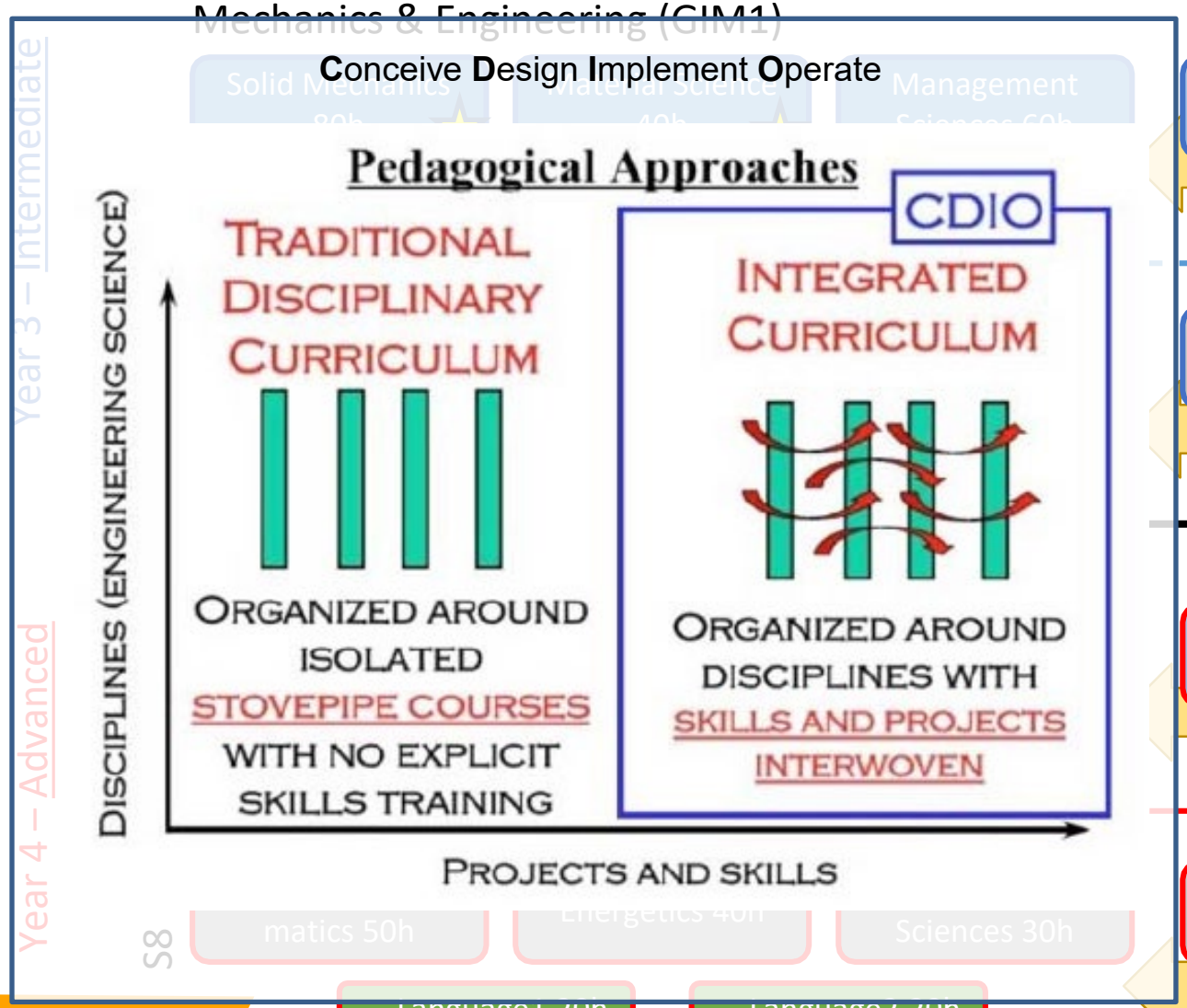
June–October 2021

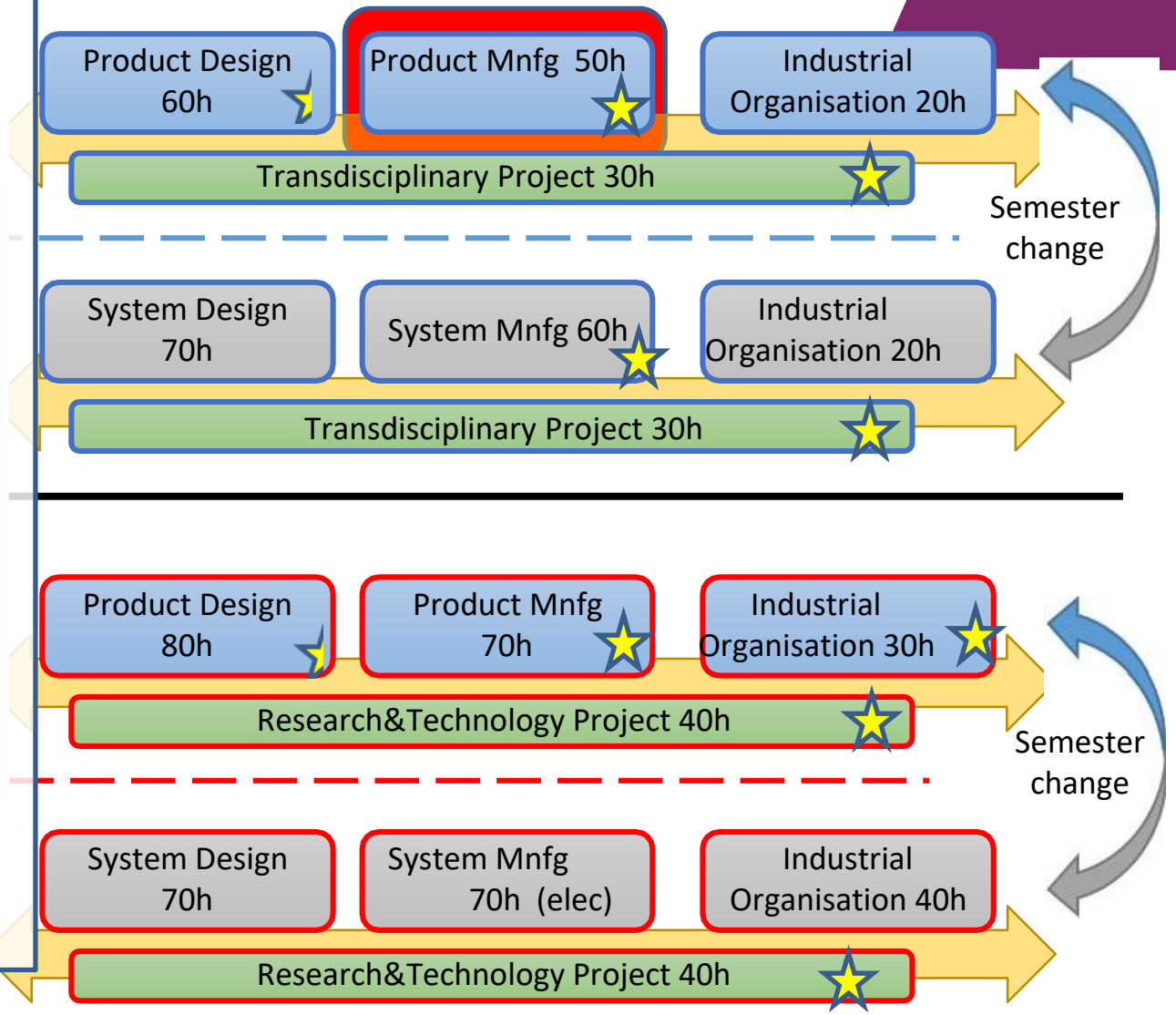
Student Recruiting

Spring 2022

First cohort exchange

Course structure at Arts et Métiers years 3 and 4





Scientific/core courses

Engineering courses

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- **Prerequisites:**
  - None

Welding, Forming and Casting

Objectives and desired outcomes

On successful completion of the module, students will be able to:

- Describe some main material processes (tools, machine design),
- Explain the physics behind the process,
- Choose a process for a given application,
- Implement and instrument a manufacturing tool,
- Follow health and safety rules during manufacturing,
- Implement the interactions between parts/processes and design/geometry
- Describe and identify the defects and be able to characterize them and their physical origins in order to solve them,
- Identify and implement the different control means (metrology, NDT)
- Determine the interactions between materials and processing

- **Grading system:**
  - 4 intermediate exams + final exam
  - 6 practical works (TP)

- **Suggested textbooks:**
  - Olson, D. L. (Ed.). (1993). ASM handbook: welding, brazing, and soldering (Vol. 6). Asm Intl.

- **Grading system:**

All marks are graded from 0 to 20

C_CE: Casting continuous evaluation
C_FE: Casting final exam
FW_CE: Forming and Welding continuous evaluation
FW_FE: Forming and Welding final exam

Final mark = 0.3 x C_CE + 0.3 x C_FE + 0,2 x FW_CE + 0,2 x FW_FE

If Final mark < 10, FAIL -> retake of final exam

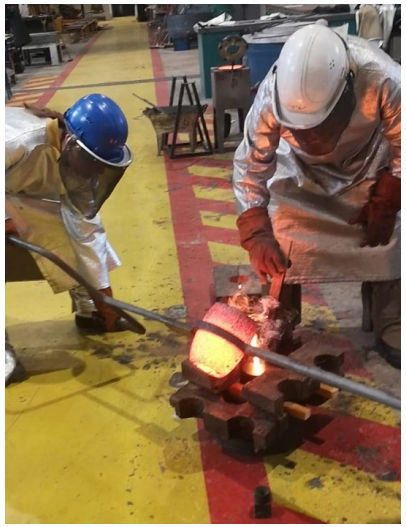
If Final mark ≥ 10, PASS

Welding (10 h)	
L1 (1h)	Introduction to welding principles Material interactions : base metal, fusion zone, HAZ
L2 (1h)	Brazing : description of processes
L3 (1h)	Welding : description of arc welding, laser beam welding, friction stir welding
L4 (1h)	Static dimensioning of welds
EX1 (2h)	Static dimensioning of welds
TP1 (4h)	Shielded metal arc welding: process parameters, weld dimensioning

Forming (10 h)	
L1 (1h)	Introduction to forming principles
L2 (1h)	Forging : process, operating conditions
L3 (1h)	Stamping : process, operating conditions
L4 (1h)	Bending : process, operating conditions
EX1 (2h)	Stamping
TP1 (4h)	Bending

L: Lecture, Ex: Exercice class, TP: Practical work (workshop)

Casting (30 h)	
L1 (2h)	Molding and casting processes: Permanent and non-permanent molds, lost wax, lost foam, casting by gravity, low pressure, high pressure
L2 (2h)	Physics of solidification: Thermodynamics of phase change, solidification path, nucleation and growth of grains, macroscopic transports phenomena and induced casting defects
L3 (2h)	Thermal analysis of a part and feeders design: Thickness analysis of a part, localisation of hot spots, rules of feeder design
L4 (2h)	Filling analysis of a part and filling system design: Filling induced defects, rules of filling system design
EX1 (2h)	Development of an analytical thermal model of cooling and solidification of a plate
EX2 (2h)	Feeders localisation and design on a given part
EX3 (2h)	Filling system localisation and design on a given part
TP1 (4h)	Green sand mold making by hand, casting and analysis of the part depending on the filling system design choice
TP2 (4h)	Green sand mold making by machin, casting and analysis of the part depending on the feeders localisation and size
TP3 (4h)	Core making, metallic mold casting and analysis of the mold design and the comparison between sand and metallic mold design
TP4 (4h)	Numerical simulation of TP1 experiment, analysis of the predicted misrun and shrinkage porosities defects and comparison to experiment



3rd YEAR Arts et Métiers – PRODUCT MANUFACTURING (INTERMEDIATE) (50H)

	Month 1	Month 2	Month 3	Month 4	Month 5
Forming	**L1** – 1 h *Principles*	**Ex1** – 2 h *Stamping*	**TP1** – 4 h *Bending*		
	L2– 1 h *Forging*				
	L3 – 1 h *Stamping*				
	L4 – 1 h *Bending*				
Welding		**L5** – 1 h *Principles*	**Ex1** – 2 h *Welding*	**TP1** – 4 h *Welding*	***EXAM*** ***Last week of the semester*** ***1 h written test***
		L6 – 1 h *Brazing*			
		L7– 1 h *Welding*			
		L8 – 1 h *Static dimension*			
Casting	**L1 – 2h** *Casting processes*	**L3 – 2h** *Feeders design*	**Ex3 – 2h** *Filling system design*	**TP3 – 4h** *Permanent mold casting*	
	L2 – 2h *Solidification physics*	**Ex2 – 2h** *Feeders design*	**TP1 – 4h** *Green sand casting by hand*	**TP4 – 4h** *Casting simulation*	
	Ex1 – 2h *Analytical solidification model*	**L4 – 2h** *Filling system design*	**TP2 – 4h** *Green sand casting by machine*		

Padlet activity – Question 1

1. By reading this Arts et Metiers syllabus, if you were the person for validating the syllabus for an American University degree plan, what questions would you have to complete the validation process for an exchange student ?
   - https://padlet.com/regiskubler/7g3eol784u46phav

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Workshop 2- Course Mapping- Question 1

By reading this Arts et Metiers syllabus, if you were the person validating the syllabus for an American University degree plan, what questions would you have to complete the validation process for an exchange student ?

REGIS KUBLER JUN 11, 2021 12:36PM

Are the expectations of American and French students similar wrt to laboratory practice? (wrt to autonomy)

How you assess the cultural aspect of your course?

Do you have any feedback from the students?

If any group work

Maybe a suggestion to encourage multicultural teams

What about the lab? there is a virtual/remote lab?

Oral activities can improve communication skills of your students.

Hello

is there any oral quiz or exam?

How do you measure the creativity of your students?

It will be great if you can discuss the syllabus with your students to have there feedback

Do you complete a pre and post assessment on cultural competency?

Do you have an assessment tool?

Credits

How many credits would you award this course at both institutions? Equivalent? Or different number of credits?

Required reading vs recommended ?What , if any, additional sources of resources (online)

How many hours of lecture?

The list of topics covered
Examples of assessments (exam, quizzes, homework, etc)
An explanation of the grading system, knowing that a 20/20 is almost never given.

Mapping Outcome

Product Manufacturing Year 3 OR Systems Manufacturing Year 3	MMET 181	· Arts&Metiers Product Manufacturing (year 3): Forming, welding, and casting. · Arts&Metiers System Manufacturing (year 3): Machining, metrology, and polymer processes. · MMET 181 covers all topics for the above courses, but does not go into detailed and comprehensive lab exercises compared to the Arts&Metiers courses · Either course could substitute MMET 181. In-depth knowledge and comprehensive lab exercises with lab reports and presentation would be beneficial to students in the long-run. · 3 lecture hours and 8 lab hours. There is no additive manufacturing content.

“Their simulation software comes with either English or French commands”

“TAMU students (international and domestic) can also receive an international engineering certificate if they spend a semester at Arts et Métiers and take an additional language course (e.g. French, Spanish, Italian..) there”

Technical Electives are also a possibility for other courses

Professors as ambassadors

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Padlet activity – Question 2

2. On a trip to the partner university, what would you like to see and learn about the partner university to recruit students for the exchange ?

Padlet activity – Question 3

3. What challenges do you find for recruiting students for semester exchanges and how do you address them ?

Anticipated outcomes

- Semester reciprocal exchange
  - 5 students for spring 2022, with 3-4 selected courses
- **Hybrid program**: Use of the infrastructure of a summer faculty led program with in-person classes taught by Arts et Métiers professors
  - 12 students for summer 2022
- Large and sustainable student participation on both program types on the following years
- Develop globally competent engineers to lead the global industry and society by intentionally integrating student engagement activities and intercultural training

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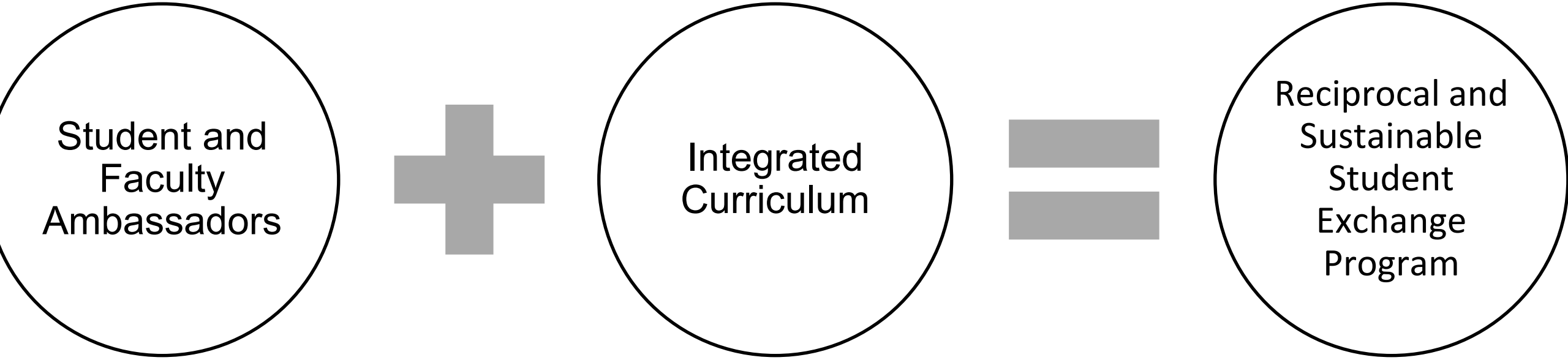
Questions about the Course Mapping Session?

Conclusion and Future Direction



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Participants Main Takeaways
&
Closing Discussion

AM² Transatlantic Partnership FOR INDUSTRY OF THE FUTURE

FACE FOUNDATION