

# Outcomes Based Education

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*Sosialisasi Roadmap Akreditasi Internasional, Universitas Sumatera Utara, 18 Juli 2019*

# Organ Akademik Perguruan Tinggi

Fakultas adalah himpunan sumber daya pendukung, yang menyelenggarakan dan mengelola pendidikan akademik, vokasi, dan/atau profesi dalam satu atau beberapa pohon/kelompok ilmu pengetahuan dan teknologi

Jurusan adalah himpunan sumber daya pendukung, yang menyelenggarakan dan mengelola pendidikan akademik, vokasi, dan/atau profesi dalam 1 (satu) atau beberapa cabang ilmu pengetahuan dan teknologi.

**Jurusan 1**

**Jurusan 2**

**Prog. Lit  
(Pusat Lit.  
Energi)**

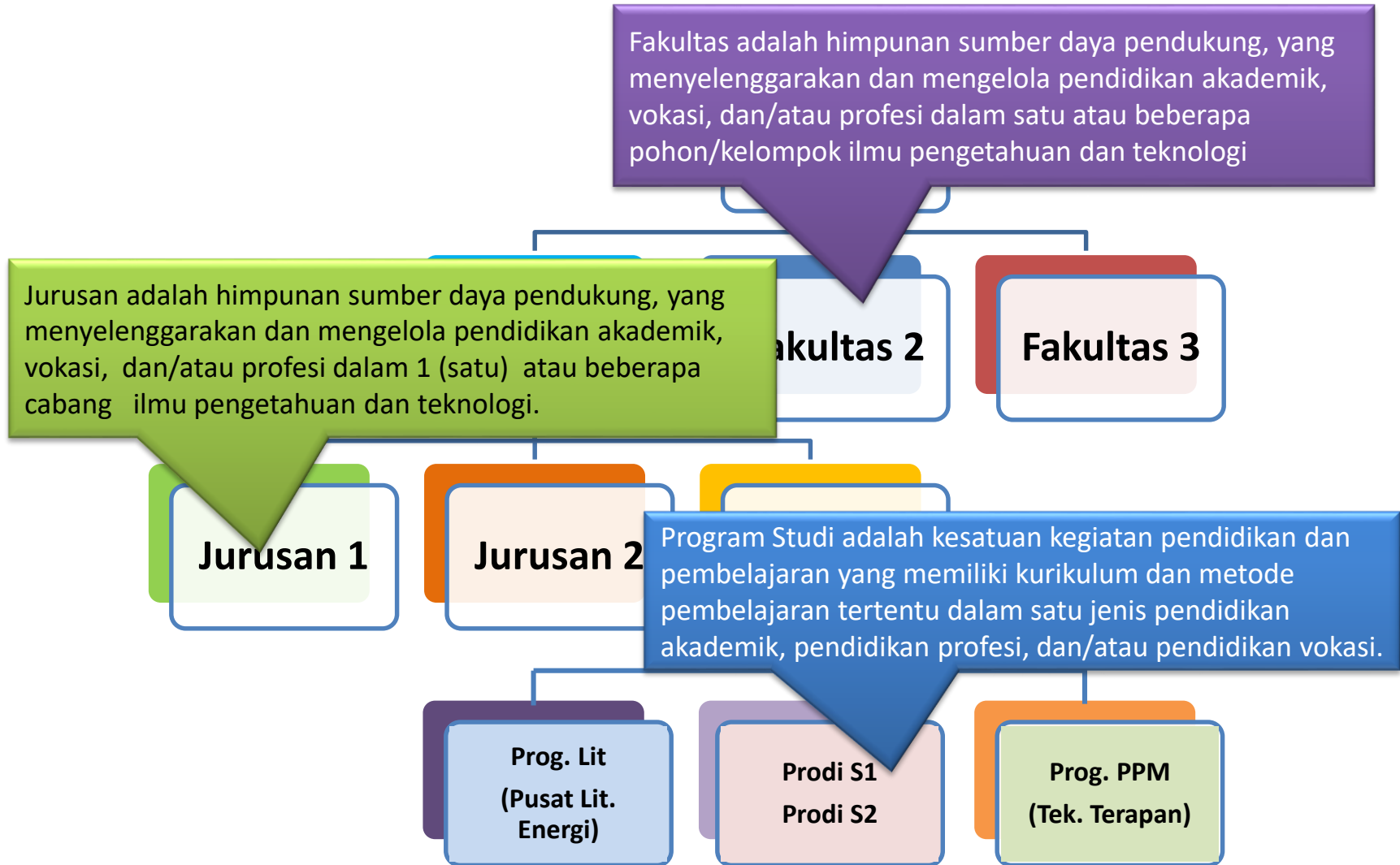
**Prodi S1  
Prodi S2**

**Prog. PPM  
(Tek. Terapan)**

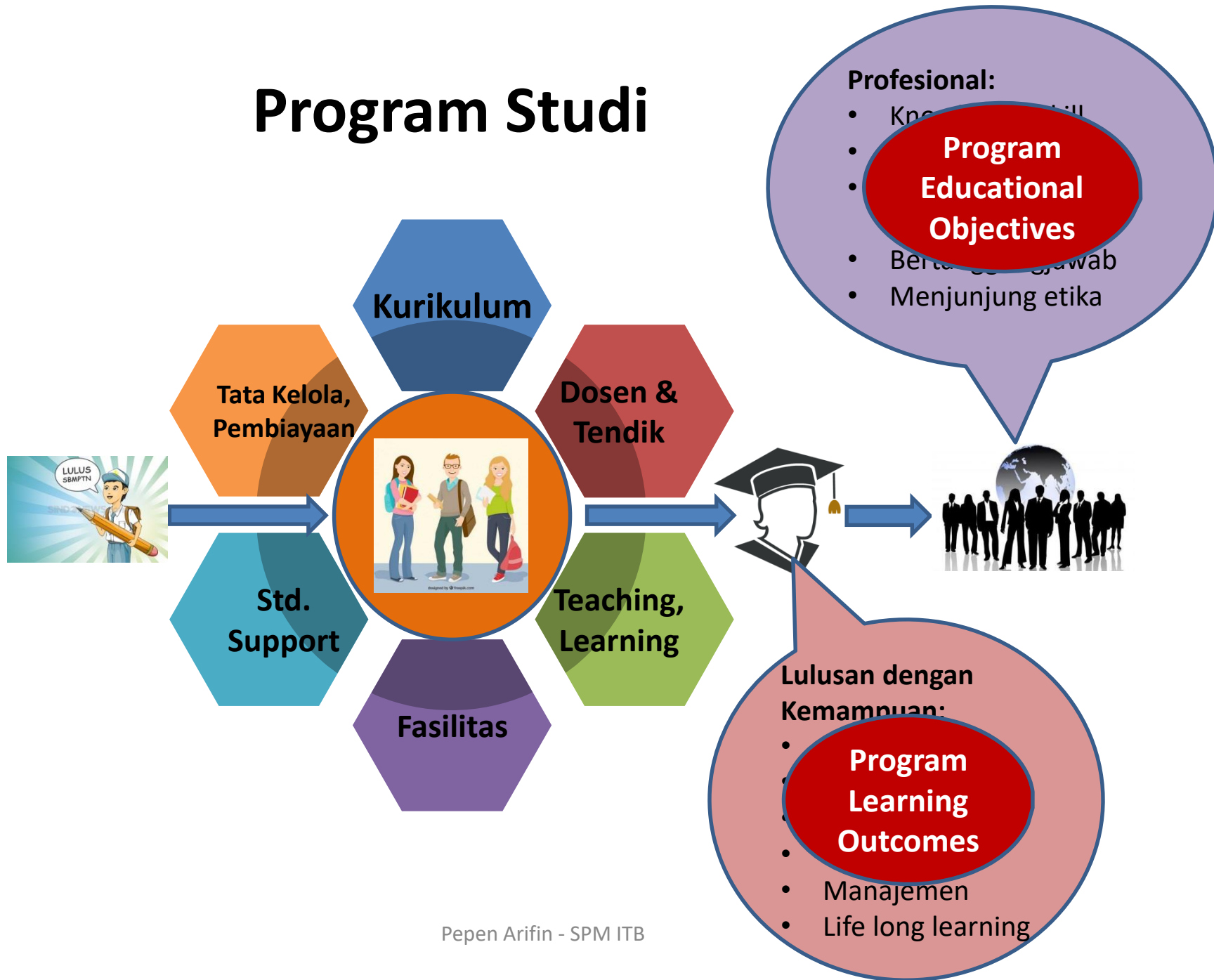
Program Studi adalah kesatuan kegiatan pendidikan dan pembelajaran yang memiliki kurikulum dan metode pembelajaran tertentu dalam satu jenis pendidikan akademik, pendidikan profesi, dan/atau pendidikan vokasi.

**Fakultas 2**

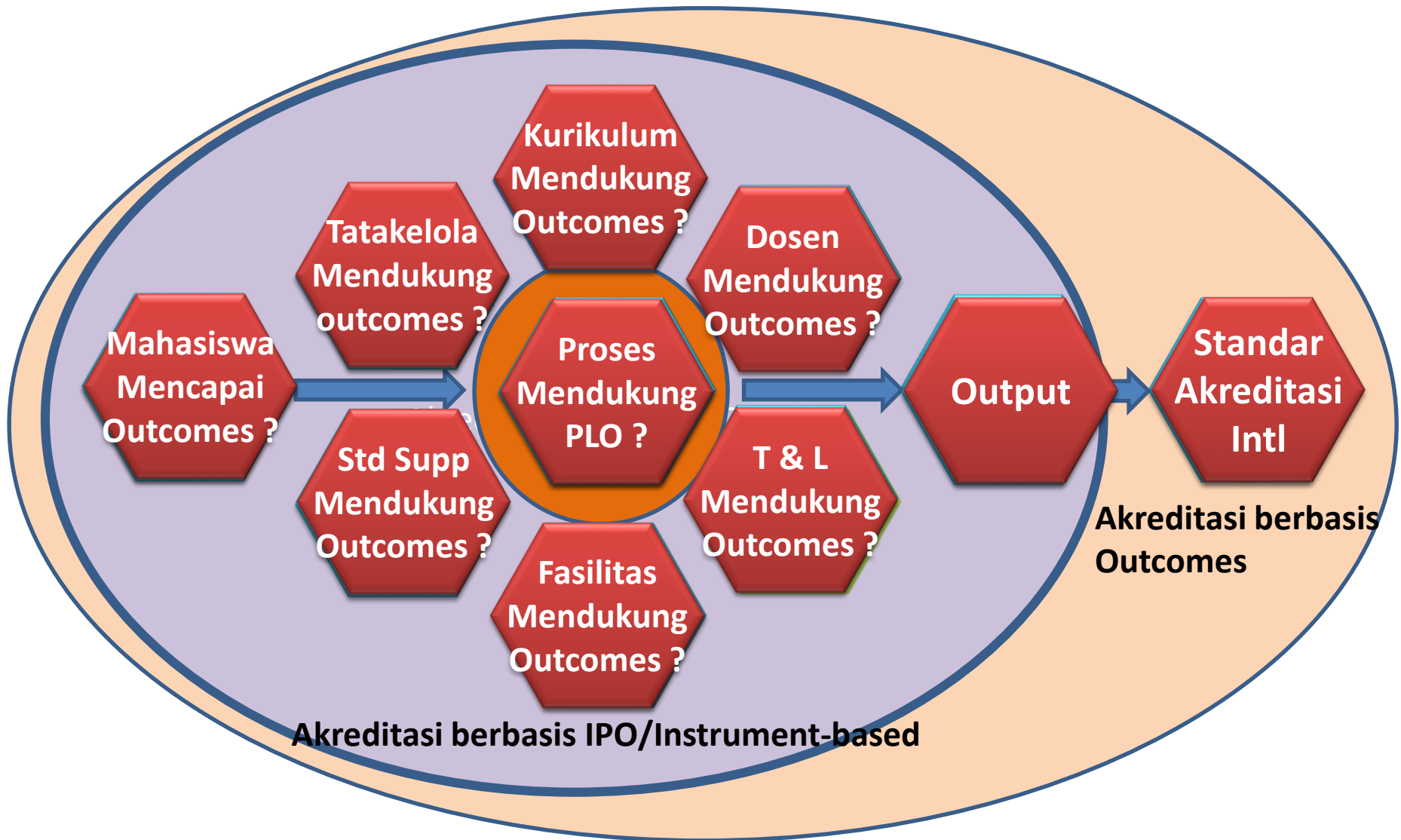
**Fakultas 3**



# Program Studi



# Program Studi dan Akreditasi BAN PT/ Internasional



# BAN-PT: Standar 9 (Luaran dan Capaian Tridharma)

## 1. Luaran Dharma Pendidikan

- a) Capaian pembelajaran → IPK
- b) Prestasi akademik mahasiswa
- c) Prestasi non-akademik mahasiswa
- d) *Length of study*, lulusan tepat waktu
- e) Waktu tunggu kerja
- f) Kinerja lulusan, tingkat kepuasan pengguna lulusan

- Standar BAN-PT mengacu pada Permenristekdikti Nomor 44 tahun 2015 (SN-DIKTI).
- Evaluasi capaian pembelajaran (SN-DIKTI)
  - Bagian kelima, Standar Penilaian Pembelajaran, pasal 24, ayat 5, Hasil penilaian capaian pembelajaran lulusan pada akhir program studi dinyatakan dengan indeks prestasi kumulatif (IPK).

## 2. Dharma penelitian dan PPM

- a) Publikasi ilmiah mahasiswa/pagelaran/pameran
- b) Sitasi dalam 3 tahun terakhir
- c) Produk/jasa
- d) HKI, Teknologi tepat guna, produk, karya seni, rekayasa sosial, buku, book chapter

# Tingkat Implementasi OBE

OBE	Outcomes	Curriculum	Assessment Plan	Outcomes Assessment	CQI
Level 1	√				
Level 2	√	√			
Level 3	√	√	√		
Level 4	√				
Level 5	√				

AUN-QA/Akreditasi Internasional



# What is OBE?

01

OBE is an educational system that focuses on what students can do successfully at the end of their learning experiences.

02

OBE involves the restructuring of curriculum, teaching and learning, assessment and reporting practices in education

03

Both structures and curricula are designed to achieve those capabilities or qualities.

04

It requires that the students demonstrate that they have learnt the required skills and content.

# OBE: It's Not What We Teach, It's What You Learn

I TAUGHT  
STRIPE HOW  
TO WHISTLE



I DON'T HEAR  
HIM  
WHISTLING



I SAID I TAUGHT  
HIM. I DIDN'T  
SAY HE LEARNED  
IT



# OBE Basic Principles



## Clarity of focus

focus on helping students to develop and acquire the knowledge, skills and competences that will enable them to achieve the learning outcomes.



## Backward design

the curriculum is designed based on a clear definition of the program learning outcomes that students are to achieve by the end of the program.



## Learning engagement

Students are encouraged to engage deeply in what they are learning.



## Expanded opportunities

Students are provided with expanded opportunities to achieve high performances

# OBE Process – Constructive Alignment



## Constructive

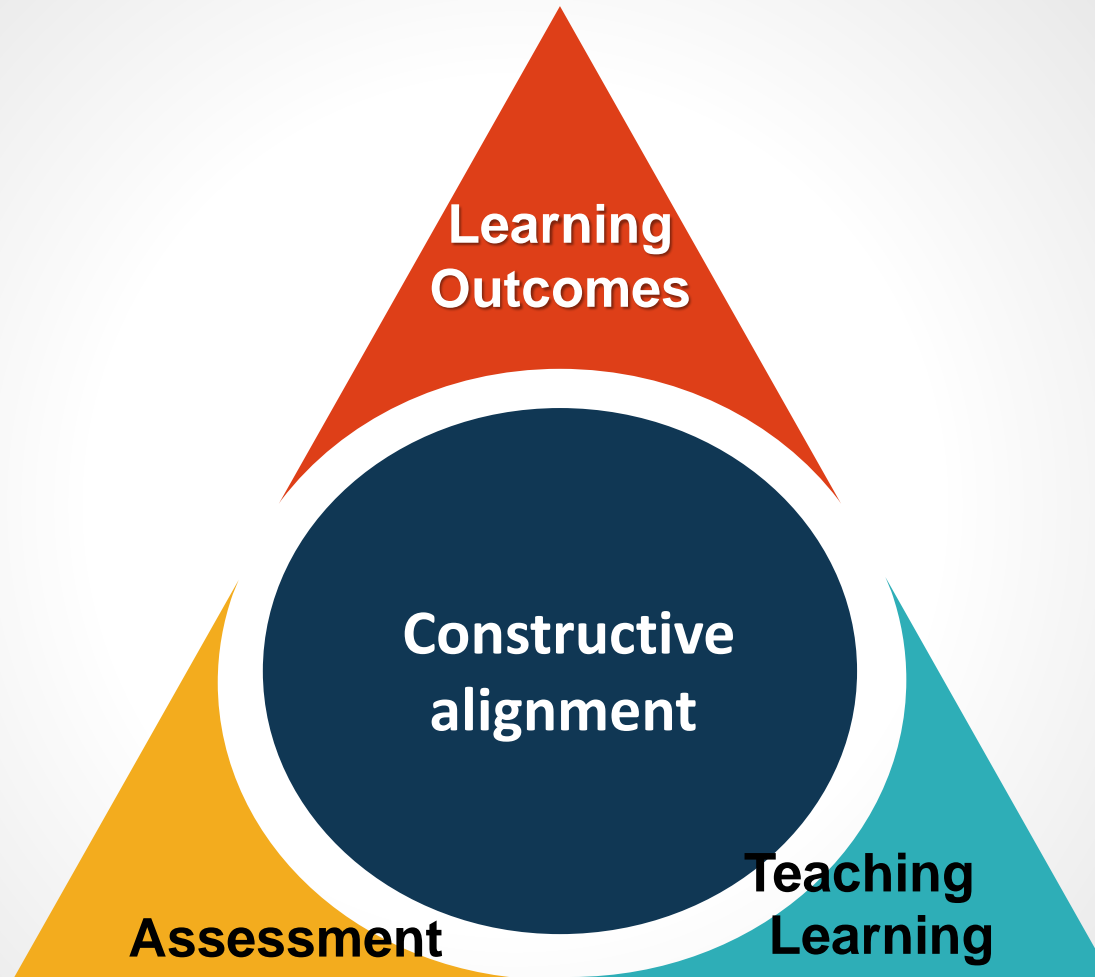
the learner does to construct meaning through relevant learning activities



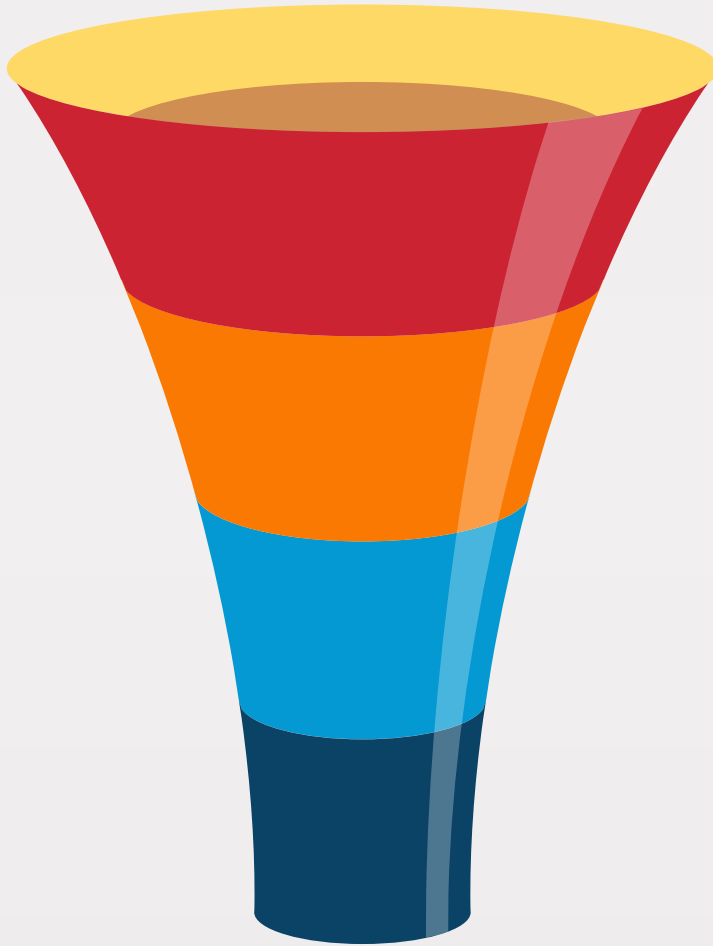
## Alignment

the teaching/learning methods/activities and the assessment tasks are aligned to the learning outcomes

# Constructive alignment



# OBE-Curriculum Platform



1

**Visi – Misi PT, Graduate Profile**

Disusun oleh Senat Akademik PT

2

**Visi – Misi Fakultas**

Disusun oleh Senat Fakultas

3

**Tujuan Prodi/PEO**

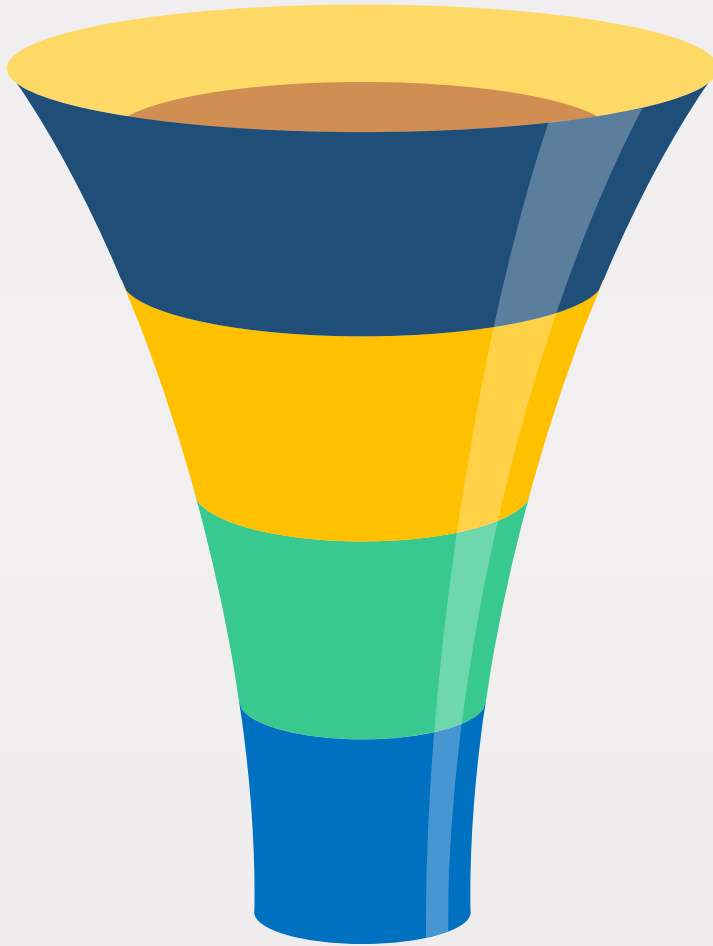
Disusun oleh Senat Fakultas,  
Advisory Board

4

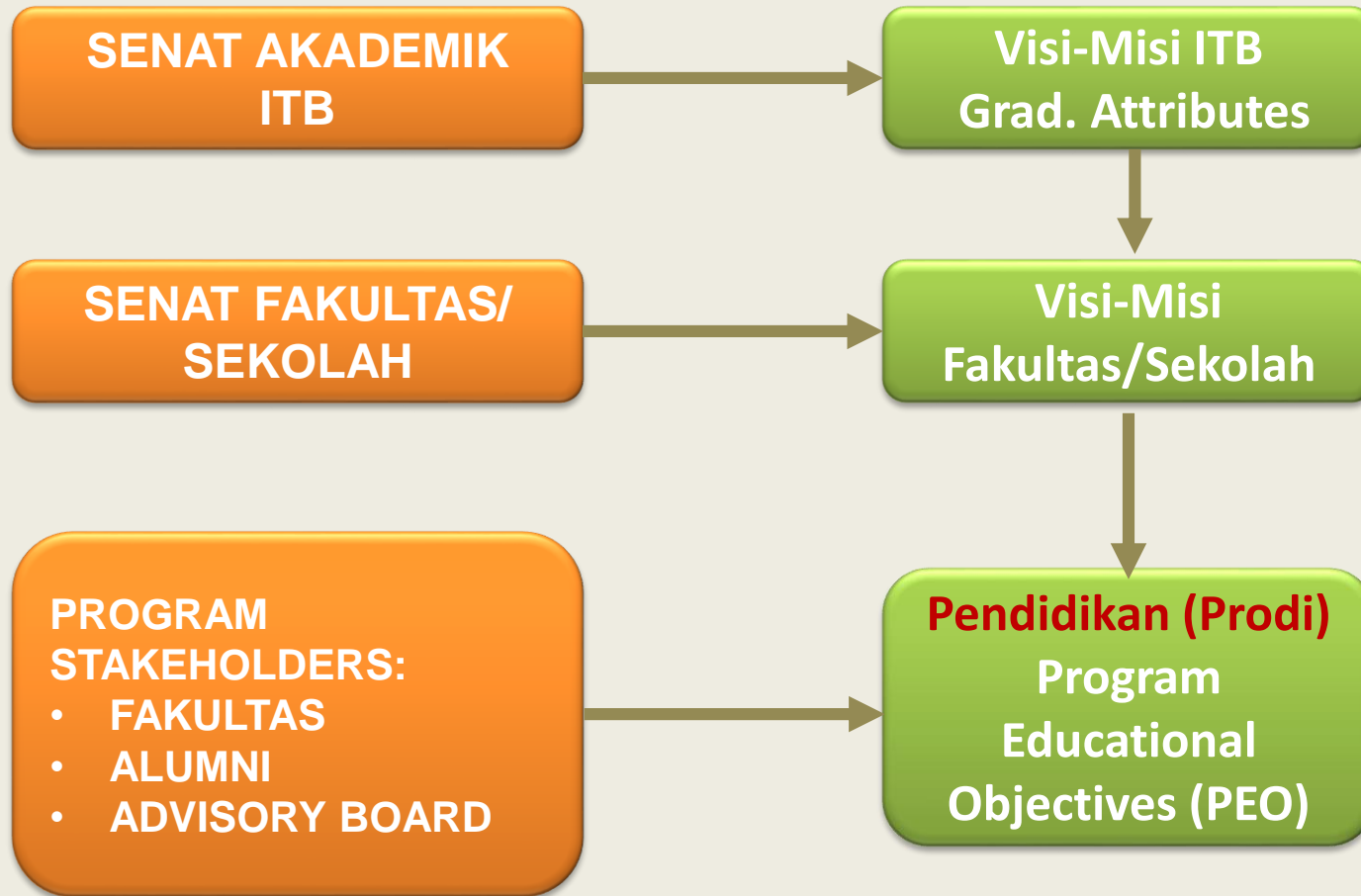
**Capaian Lulusan/PLO/SO/LG**

Disusun oleh Tim Kurikulum

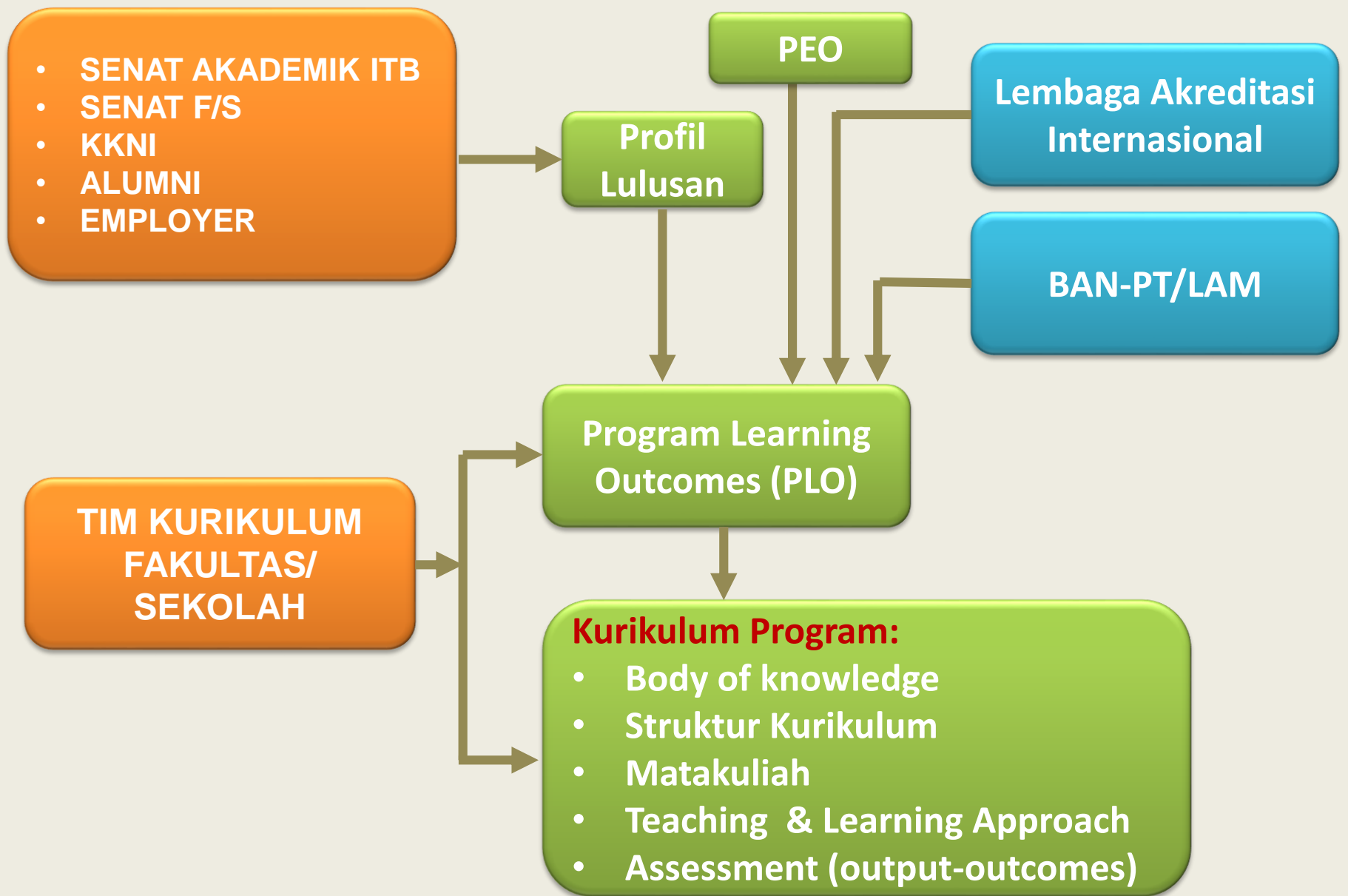
# OBE-Curriculum Platform

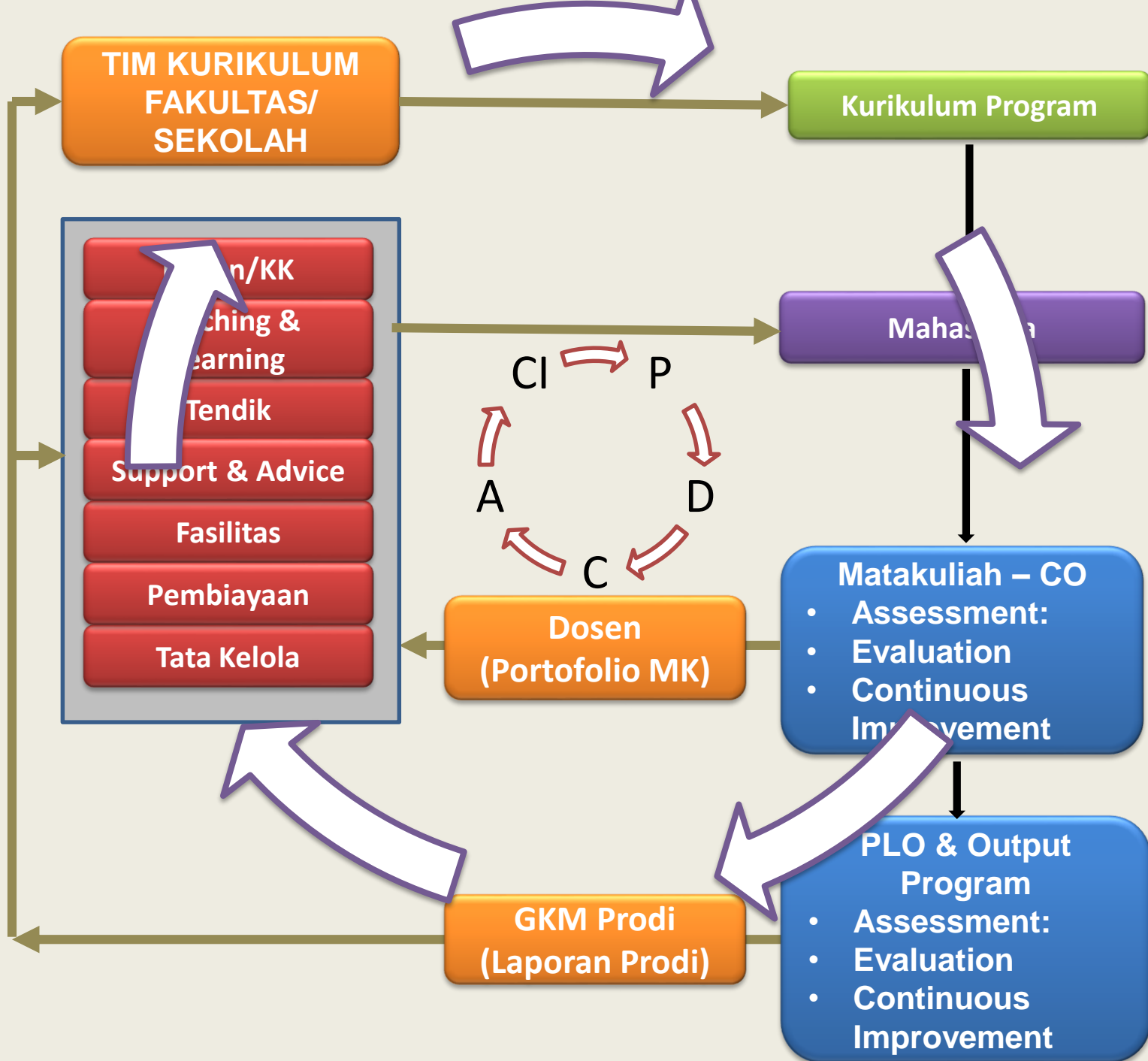


# Kurikulum OBE









# **Program Educational Objectives**

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# Definition (1)

## Program Educational Objectives (PEO)

Pernyataan yang secara luas menggambarkan pencapaian karir dan professional yang disiapkan oleh program studi untuk dicapai oleh lulusannya dalam beberapa tahun pertama setelah lulus

# Program Educational Objectives

## Professional Accomplishment

Profesional, insinyur, dokter, saintis, peneliti, dosen, guru, sastrawan, seniman, wirausahawan, advokat, yang ahli dibidangnya.

## Academic Accomplishment

Mampu berkembang dan belajar hidup sepanjang hayat untuk melanjutkan pendidikan, baik formal maupun informal

## General/Social Accomplishment

Memahami etika profesi, bertanggungjawab, berkontribusi secara positif, befikir kritis, kreatif dan menunjukkan kepeloporan dan kepemimpinan

# Contoh PEO: Mining Engineering Program

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To bring forth graduates who in their early career become **mining engineers** with following attributes:

- ❑ **Mining engineers** with capability to utilize their knowledge and skills in mining engineering practice that includes **mine exploration & development, mine planning & design and mining operation**
- ❑ Engineers with understanding of **good and environmental friendly mining practice** and understanding of **professional and ethical responsibilities**
- ❑ Individuals with a **life-long learning** attitude through graduate studies, research and professional activities, both nationally and internationally

# Contoh PEO: Chemical Engineering Program

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- ❑ Excel in careers in the **chemical, petroleum, petrochemical, pharmaceutical, food, biotechnology, microelectronics, energy, materials processing or other related industries/organizations;**
- ❑ **Pursue advanced degrees** and/or certifications for a career in engineering, academia, business, law, medicine, or research and development;
- ❑ Display **leadership**, and also contemporary and global outlook;
- ❑ Demonstrate high-level of **professionalism, ethical and social responsibility, independent learning, and desire for life-long learning.**

**Program Learning  
Outcomes/  
Student Outcomes/  
Learning Goals**

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# Defining Learning Outcomes (LO)

01

Learning outcomes must be simply and clearly described

02

Learning outcomes must reflect the level of capability as well as the range.

03

Learning outcomes must be capable of being validly assessed.

# Types of Learning Outcomes

01

Disciplinary knowledge and skills

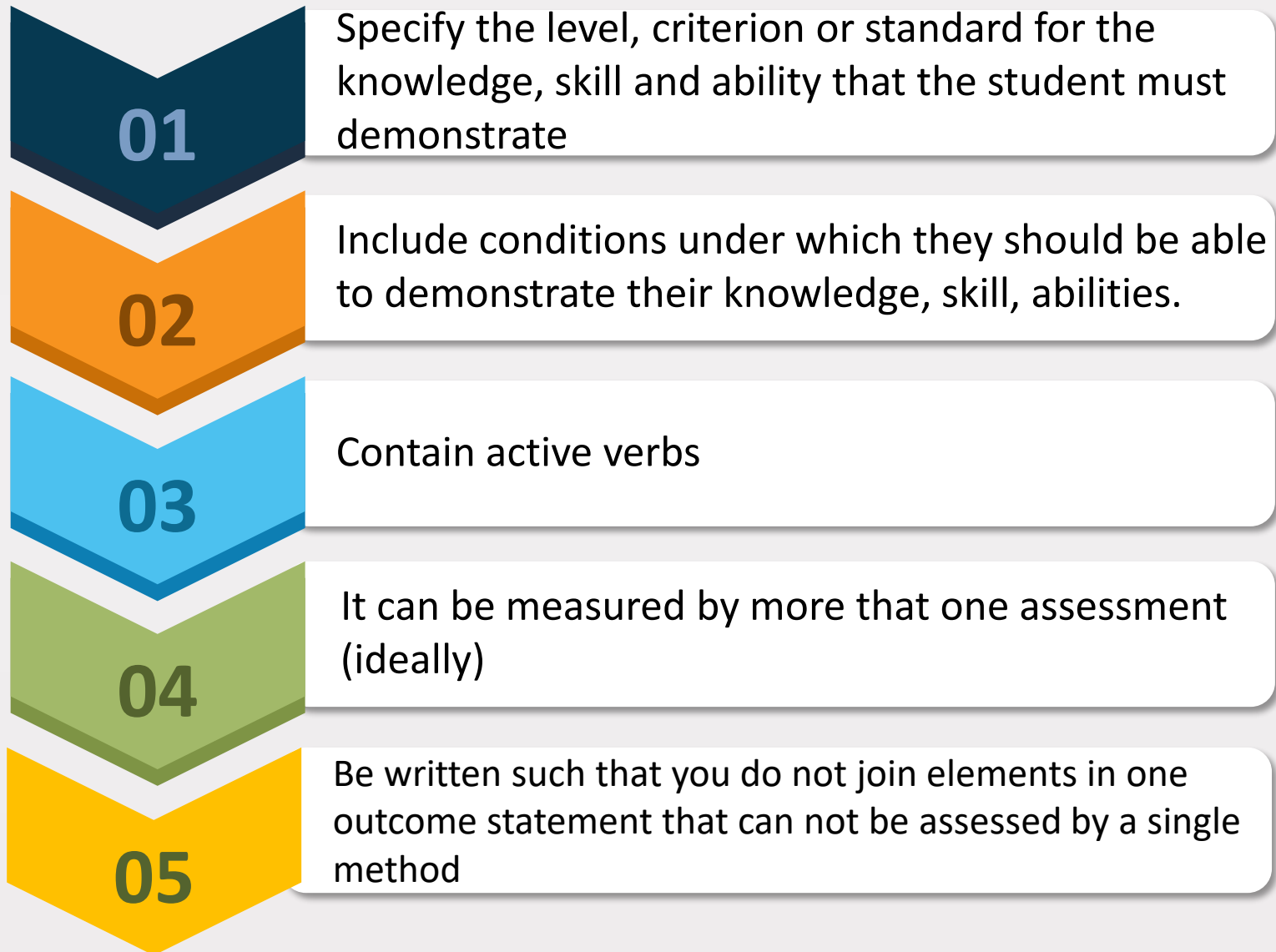
02

Generic skills

03

Attitudes and values

# Characteristics of good learning outcome



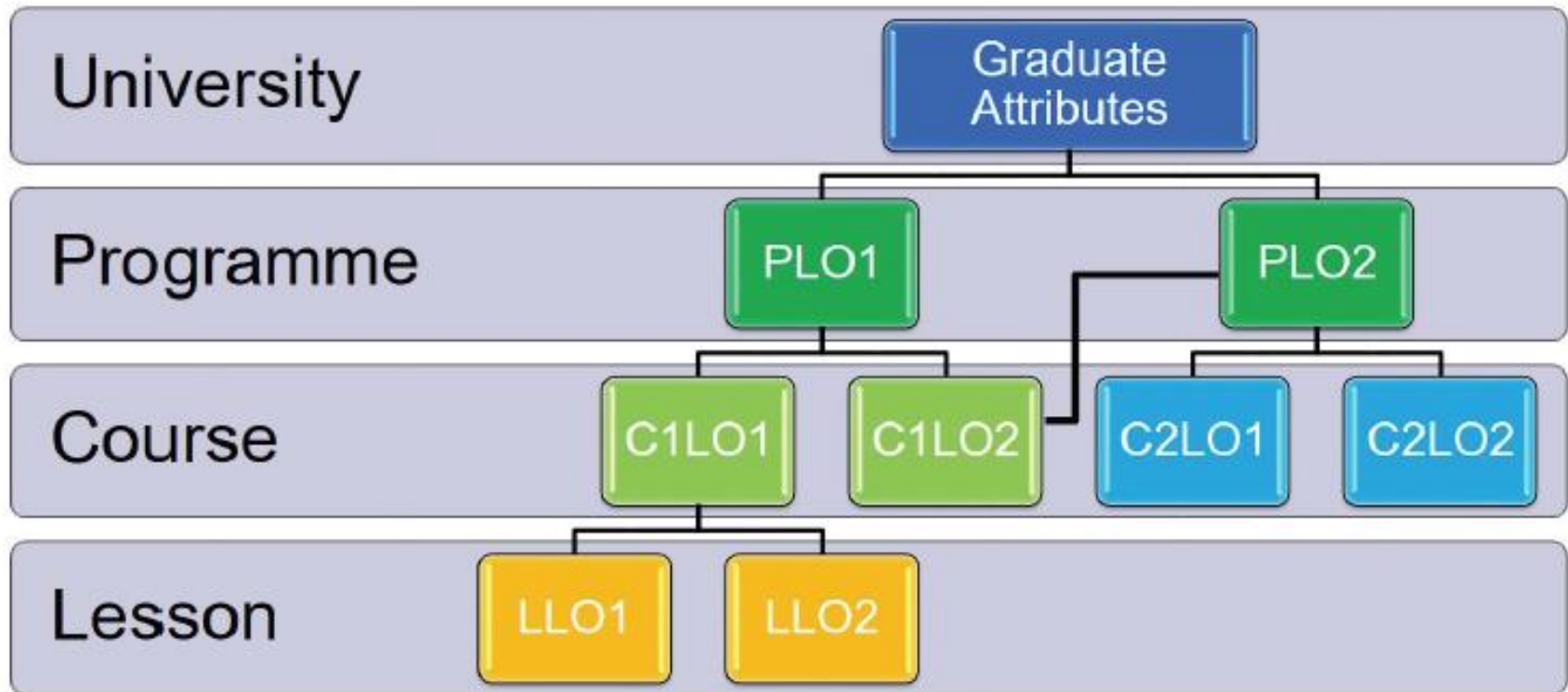
## RUMUSAN SIKAP (SN DIKTI)

1. bertakwa kepada Tuhan Yang Maha Esa dan mampu menunjukkan sikap religius;
2. menjunjung tinggi nilai kemanusiaan dalam menjalankan tugas berdasarkan agama, moral, dan etika;
3. berkontribusi dalam peningkatan mutu kehidupan bermasyarakat, berbangsa, bernegara, dan kemajuan peradaban berdasarkan Pancasila;
4. berperan sebagai warga negara yang bangga dan cinta tanah air, memiliki nasionalisme serta rasa tanggungjawab pada negara dan bangsa;
5. menghargai keanekaragaman budaya, pandangan, agama, dan kepercayaan, serta pendapat atau temuan orisinal orang lain;
6. bekerja sama dan memiliki kepekaan sosial serta kepedulian terhadap masyarakat dan lingkungan;
7. taat hukum dan disiplin dalam kehidupan bermasyarakat dan bernegara;
8. menginternalisasi nilai, norma, dan etika akademik;
9. menunjukkan sikap bertanggungjawab atas pekerjaan di bidang keahliannya secara mandiri;
10. menginternalisasi semangat kemandirian, kejuangan, dan kewirausahaan.

# RUMUSAN KETERAMPILAN UMUM (SARJANA)

1. mampu menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam konteks pengembangan atau implementasi ilmu pengetahuan dan teknologi yang memperhatikan dan menerapkan nilai humaniora yang sesuai dengan bidang keahliannya;
2. mampu menunjukkan kinerja mandiri, bermutu, dan terukur;
3. mampu mengkaji implikasi pengembangan atau implementasi ilmu pengetahuan teknologi yang memperhatikan dan menerapkan nilai humaniora sesuai dengan keahliannya berdasarkan kaidah, tata cara dan etika ilmiah dalam rangka menghasilkan solusi, gagasan, desain atau kritik seni, menyusun deskripsi saintifik hasil kajiannya dalam bentuk skripsi atau laporan tugas akhir, dan mengunggahnya dalam laman perguruan tinggi;
4. menyusun deskripsi saintifik hasil kajian tersebut di atas dalam bentuk skripsi atau laporan tugas akhir, dan mengunggahnya dalam laman perguruan tinggi;
5. mampu mengambil keputusan secara tepat dalam konteks penyelesaian masalah di bidang keahliannya, berdasarkan hasil analisis informasi dan data;
6. mampu memelihara dan mengembangk-an jaringan kerja dengan pembimbing, kolega, sejawat baik di dalam maupun di luar lembaganya;
7. mampu bertanggungjawab atas pencapaian hasil kerja kelompok dan melakukan supervisi dan evaluasi terhadap penyelesaian pekerjaan yang ditugaskan kepada pekerja yang berada di bawah tanggungjawab
8. mampu melakukan proses evaluasi diri terhadap kelompok kerja yang berada dibawah tanggung jawabnya, dan mampu mengelola pembelajaran secara mandiri; dan
9. mampu mendokumentasikan, menyimpan, mengamankan, dan menemukan kembali data untuk menjamin kesahihan dan mencegah plagiasi.

# Hierarchy of Learning Outcomes



Learning Outcomes Tree

# Penyusunan PLO/SO/LG

## PEO

Pernyataan yang secara luas menggambarkan pencapaian karir dan professional yang disiapkan oleh program studi untuk dicapai oleh lulusannya dalam beberapa tahun pertama setelah lulus

## Akreditasi Internasional

Outcomes Akreditasi Internasional



## BAN-PT, KKNI

- Instrumen BAN – PT
- Jenjang KKNI

## Profil Lulusan

Deskripsi tentang karakter, sikap, pengetahuan, dan keterampilan lulusan perguruan tinggi yang diharapkan berkembang selama mereka menempuh studinya dalam rangka membekali lulusan tersebut untuk studi lanjut atau pekerjaannya. Profil lulusan memberikan fondasi untuk atribut tingkat kualifikasi lulusan.

# Action Verbs: Cognitive (Bloom Taxonomy)

REMEMBER	UNDERSTAND	APPLY	ANALYZE	EVALUATE	CREATE
Retrieve knowledge from long-term memory	Construct meaning from instructional messages, including oral, written, graphic communication	Carry out/use procedure in a given situation	Break material into constituent parts; determine how parts relate to one another and to an overall structure or purpose	Make judgments based on criteria and standards	Put elements together to form coherent or functional whole; reorganize elements into a new pattern or structure
<u>Sample Verbs:</u>	<u>Sample Verbs:</u>	<u>Sample Verbs:</u>	<u>Sample Verbs:</u>	<u>Sample Verbs:</u>	<u>Sample Verbs:</u>
<ul style="list-style-type: none"> <li>Define</li> <li>Describe</li> <li>Label</li> <li>List</li> <li>Match</li> <li>Recall</li> <li>Recognize</li> <li>State</li> </ul>	<ul style="list-style-type: none"> <li>Classify</li> <li>Compare</li> <li>Discuss</li> <li>Exemplify</li> <li>Explain</li> <li>Identify</li> <li>Illustrate</li> <li>Infer</li> <li>Interpret</li> <li>Predict</li> <li>Report</li> <li>Review</li> <li>Summarize</li> <li>Translate</li> </ul>	<ul style="list-style-type: none"> <li>Apply</li> <li>Change</li> <li>Choose</li> <li>Demonstrate</li> <li>Execute</li> <li>Implement</li> <li>Prepare</li> <li>Solve</li> <li>Use</li> </ul>	<ul style="list-style-type: none"> <li>Analyze</li> <li>Attribute</li> <li>Debate</li> <li>Differentiate</li> <li>Distinguish</li> <li>Examine</li> <li>Organize</li> <li>Research</li> </ul>	<ul style="list-style-type: none"> <li>Appraise</li> <li>Check</li> <li>Critique</li> <li>Judge</li> </ul>	<ul style="list-style-type: none"> <li>Compose</li> <li>Construct</li> <li>Create</li> <li>Design</li> <li>Develop</li> <li>Formulate</li> <li>Generate</li> <li>Invent</li> <li>Make</li> <li>Organize</li> <li>Plan</li> <li>Produce</li> <li>Propose</li> </ul>



# Program Learning Outcomes/Student Outcomes/ Learning Goals

## Professional/ specialist outcomes

- Kemampuan intelektualitas
- Penguasaan keilmuan (knowledge)
- Aplikasi pengetahuan (skill)
- Kompetensi bidang keilmuan
- Problem solver

## Social/generic outcomes

- Communication
- Team work
- Management and leadership
- Life-long learning
- Self development
- Soft skill lainnya

## KKNI - LEVEL 6 (SARJANA/DIPLOMA-4)

- Mampu **mengaplikasikan** bidang keahliannya dan memanfaatkan IPTEKS pada bidangnya dalam **penyelesaian masalah** serta mampu beradaptasi terhadap situasi yang dihadapi.
- **Menguasai konsep teoritis** bidang pengetahuan tertentu secara umum dan konsep teoritis bagian khusus dalam bidang pengetahuan tersebut secara mendalam, serta mampu memformulasikan penyelesaian masalah prosedural.
- Mampu **mengambil keputusan** yang tepat berdasarkan analisis informasi dan data, dan mampu memberikan petunjuk dalam memilih berbagai alternatif solusi secara mandiri dan kelompok.
- **Bertanggung jawab** pada pekerjaan sendiri dan dapat diberi tanggung jawab atas pencapaian hasil kerja organisasi.

# Contoh: Program Learning outcomes (Physics)

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1. Mampu menunjukkan pengetahuan tentang konsep-konsep fisika klasik dan fisika modern melalui **identifikasi** sifat-sifat fisis dari suatu sistem fisis.
2. Dapat **memformulasi** sistem fisis standar ke dalam model fisis dengan menggunakan matematika.
3. Dapat **memecahkan masalah** suatu sistem fisis standar secara komprehensif menggunakan matematika dan perangkat komputasi.
4. Dapat **menganalisis** sistem fisis dengan mengaplikasikan matematika dan perangkat komputasi/ICT.
5. Dapat **mendesain** dan melaksanakan eksperimen dalam bidang fisika atau bidang lain terkait fisika, serta dapat mengolah, menganalisis, dan menginterpretasi data yang diperoleh.

- 
6. Mempunyai kemampuan dasar dalam komunikasi lisan dan mampu menulis laporan ilmiah dalam format penulisan yang sesuai.
  7. Dapat bekerja secara efektif, baik secara individu maupun dalam grup.
  8. Dapat **mengaplikasikan** pengetahuannya dalam bidang fisika ke bidang yang lebih luas / permasalahan interdisiplin.
  9. Memiliki karakter dasar seorang ilmuwan yang baik.
  10. Mempunyai kemampuan untuk meningkatkan pengetahuannya dan dapat melanjutkan studi ke tingkat yang lebih tinggi.

# Action Verbs: Cognitive (Bloom Taxonomy)

REMEMBER	UNDERSTAND	APPLY	ANALYZE	EVALUATE	CREATE
Retrieve knowledge from long-term memory	Construct meaning from instructional messages, including oral, written, graphic communication	Carry out/use procedure in a given situation	Break material into constituent parts; determine how parts relate to one another and to an overall structure or purpose	Make judgments based on criteria and standards	Put elements together to form coherent or functional whole; reorganize elements into a new pattern or structure
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# Example: Matrix PEO – SO/PLO



Table 3-2 Correlation of PEO and SO of Chemical Engineering Program ITB

No	Graduate Capabilities	PEO No. 1	PEO No. 2	PEO No. 3
a.	an ability to apply knowledge of mathematics, science, and engineering	✓		✓
b.	an ability to design and conduct experiments, as well as to analyze and interpret data	✓		
c.	an ability to design a system, component, or process to meet desired needs with realistic constraints	✓		
d.	an ability to function on multi-disciplinary teams	✓	✓	
e.	an ability to identify, formulate, and solve engineering problems	✓		
f.	an understanding of professional and ethical responsibility		✓	
g.	an ability to communicate effectively		✓	
h.	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context		✓	✓
i.	a recognition of the need for and an ability to engage in life-long learning			✓
j.	a knowledge of contemporary issues			✓
k.	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	✓		

**#1: technical**  
**#2: softskills ;**  
**#3: further study**

# **Program Learning Outcomes dan Matakuliah**

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# Dari Learning Outcomes ke Matakuliah (Fisika)

Memahami konsep fisika klasik dan fisika modern  
PLO1 – PLO4

- Fisika Dasar
- Mekanika
- Listrik Magnet
- Fisika Modern
- Termodinamika
- Gelombang
- Fisika Kuantum
- Fisika Matematika
- Fisika Zat Padat
- Fisika Inti

Merancang,  
melaksanakan  
eksperimen dan  
menganalisis data PLO 5

- Elektronika
- Teknik Pengukuran
- Fisika Komputasi

Mempunyai kemampuan dasar dalam komunikasi lisan & tulisan

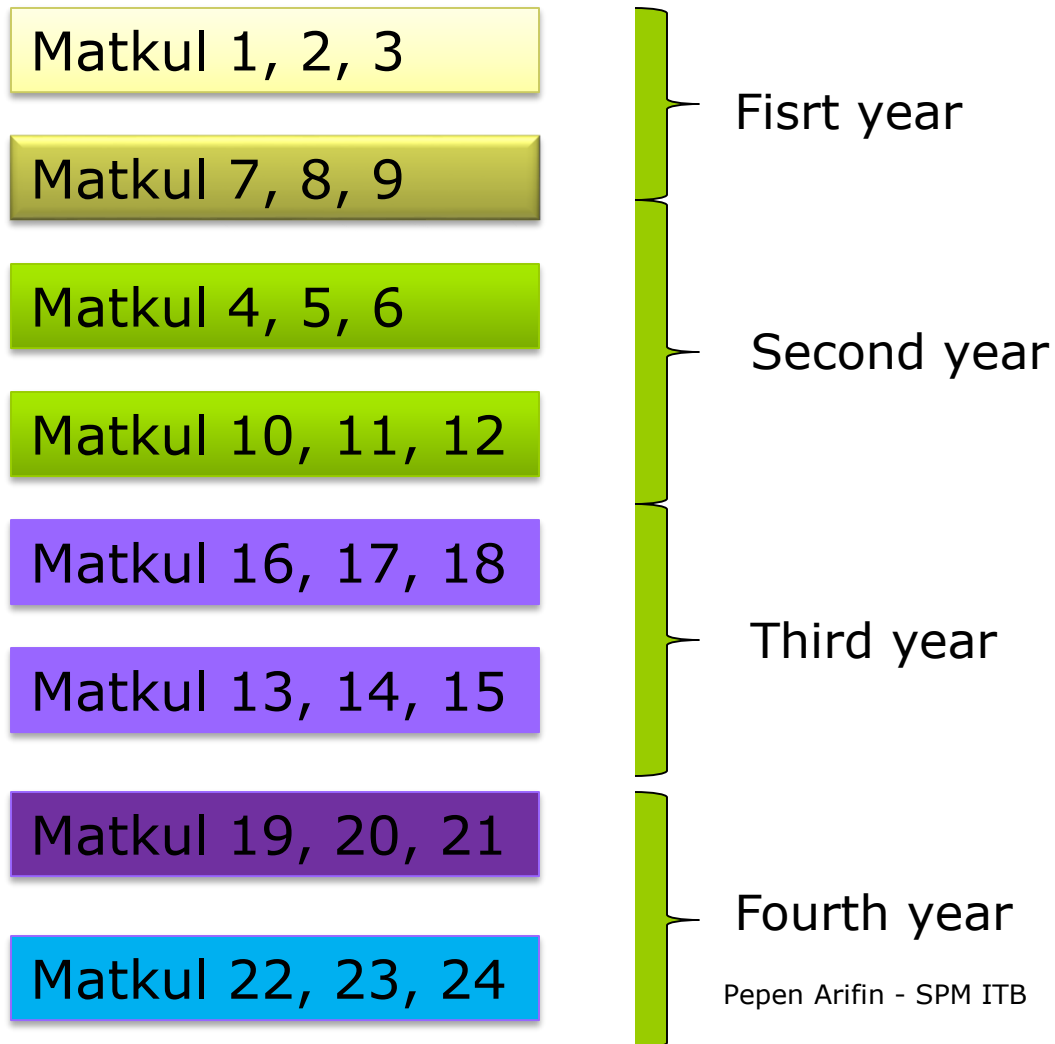
- Bahasa Indonesia
- Bahasa Inggris
- Komposisi
- Scientific communication

**Roadmap Matakuliah → PLO**



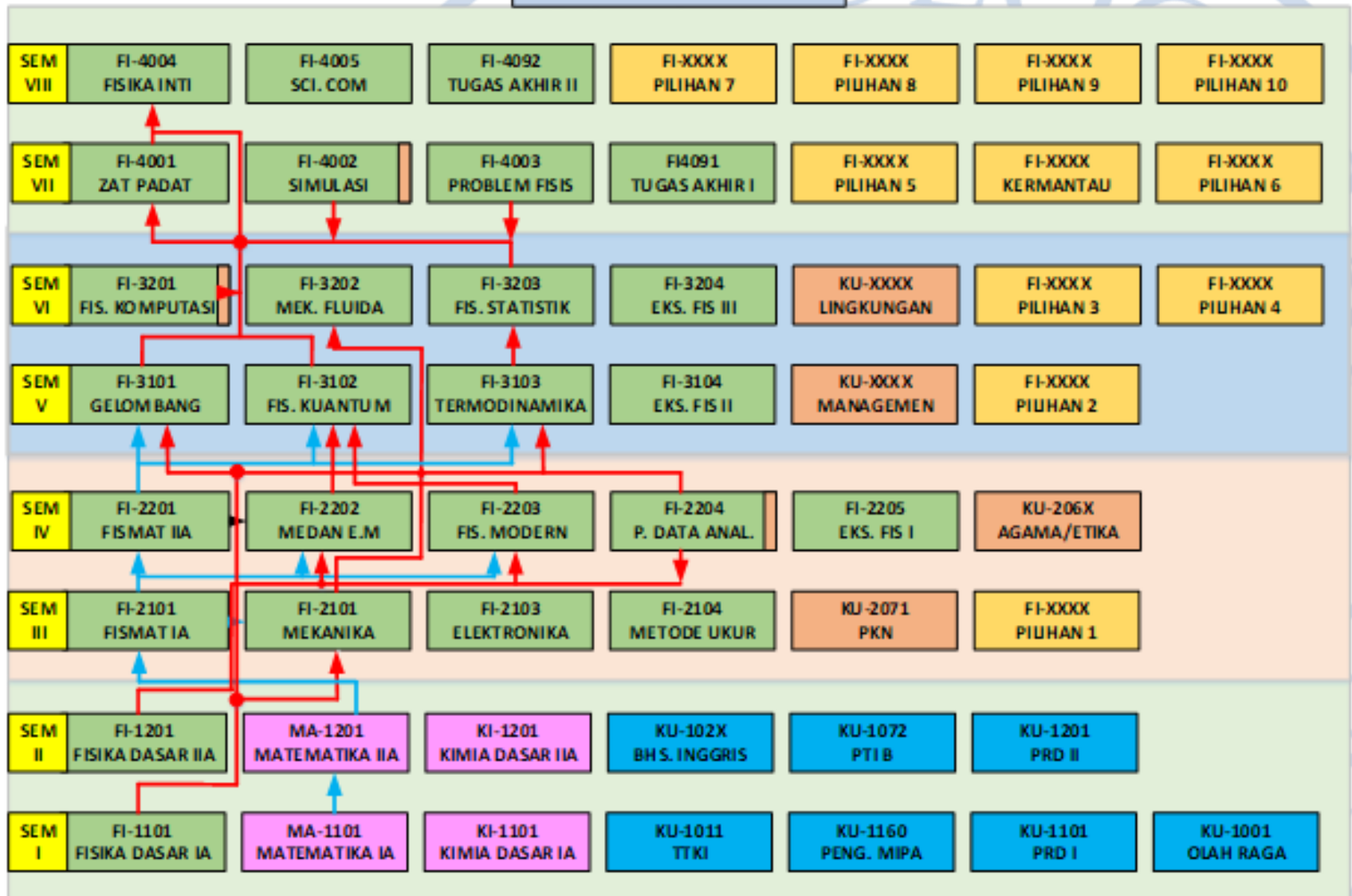
# Program Structure

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### ROADMAP PLO 1 – PLO 4



# Mapping of the courses that support the program learning outcomes (PLO)

No	Code	Course Name	CU	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PL10
1	FI1101	Fisika Dasar IA	4 (1)	X	X	X	X	X					
2	KI1101	Kimia Dasar IA	3								X		
3	KU1011	Bahasa Indonesia	2						X				
4	KU1101	Olahraga	2									X	
5	MA1201	Mathematika IIA	4	X	X	X	X						
6	FI1201	Fisika Dasar IIA	4 (1)	X	X	X	X	X					
7	KI1201	Kimia Dasar IIA	3								X		
8	KU102x	Bahasa Inggris	2						X				
9	FI2101	Fisika Matematika I	4	X	X	X	X						
10	FI2102	Mekanika	4	X	X	X	X						
11	FI2103	Elektronika	4					X					
12	FI2201	Fisika Matematika II	4	X	X	X	X						
13	FI2202	Listrik Magnet	4	X	X	X	X						
14	FI2203	Fisika Modern	3	X									

# Outcomes Matakuliah

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- ❑ Masing-masing matakuliah memiliki *course outcomes (CO)*.
- ❑ Setiap CO harus *inline* dengan PLO
- ❑ Setiap CO harus mendukung PLO yang terkait
- ❑ Setiap Matakuliah bisa memiliki LO knowledge/skill/competence saja, atau gabungan diantaranya.

# Matrix: PLO - CO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
Course 1	●		●		
Course 2		●	●		●
Course 3	●			●	
Course 4					●
Course 5	●	●			
Course 6			●	●	
Course 7				●	●
Course 8	●	●			

# Course LO (FI2102 Mechanics)

1. Ability to **demonstrate** knowledge of Newtonian mechanics of a single particle and system particles
2. Ability to **solve** a standard problem in Newtonian mechanics such as in particle dynamics, oscillating system, central forces, and simple coupled system
3. Ability to **analyze** motion of particle in Newtonian mechanics
4. Ability to **identify, formulate and answer problems** on Newtonian mechanics in non-inertial frame
5. Ability to **formulate and apply** Lagrange's and Hamilton's equations to simple physical systems
6. Ability to **solve** dynamical problems involving particles and system of particles by using the Lagrangian and Hamiltonian formulation.

# Mapping Course learning Outcome (CO) and PLO

<div style="text-align: center;">Program Learning Outcome</div> <div style="text-align: left;">Course Outcome</div>	PLO 1: They are able to demonstrate their knowledge of classical and modern physics by <b>identifying</b> physical properties of a physical system	PLO 2: They are able to <b>formulate</b> a standard physical system into a physical model by using mathematics.	PLO 3: They are able to <b>solve</b> problems of a standard physical system comprehensively by the use of mathematics and computational tools.	PLO 4: They are able to <b>analyse</b> physical system by applying mathematics and computational tools/ICT.
CO1: Ability to <b>demonstrate</b> knowledge of Newtonian mechanics of a single particle and system particles	<b>X</b>			
CO2: Ability to <b>solve</b> a standard problem in Newtonian mechanics such as in particle dynamics, oscilating system, central forces, and simple coupled system.			<b>X</b>	
CO3: Ability to <b>analyze</b> motion of particle in Newtonian mechanics				<b>X</b>
CO4: Ability to <b>identify, formulate and answer</b> problems on Newtonian mechanics in non-inertial frame	<b>X</b>	<b>X</b>	<b>X</b>	
CO5: Ability to <b>formulate and apply</b> Lagrange's and Hamilton's equations to simple physical systems		<b>X</b>		
CO6: Ability to <b>solve</b> dynamical problems involving particles and system of particles by using the Lagrangian and Hamiltonian formulation.			<b>X</b>	

# **Outcomes Assessment**

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# Purpose of outcome assessment

- What proportion of our graduates is able to achieve the professional and generic competencies?
- Which of the learning outcomes of our program have been achieved satisfactorily and which outcomes need improving ?
- What improvement actions should we take to enhance program effectiveness? What data can we use to inform the decision, and how?

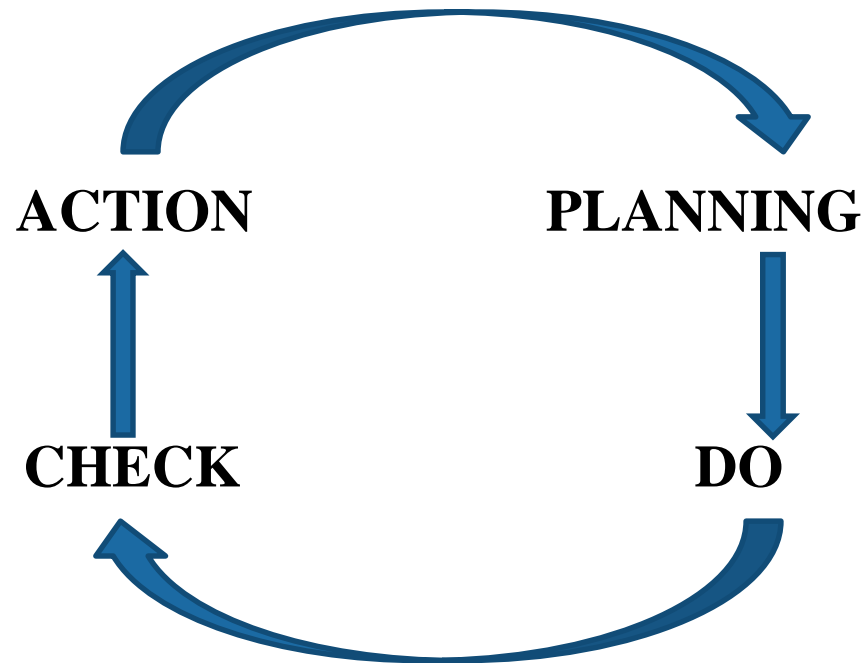
# Can we use course grade to assess learning outcomes?

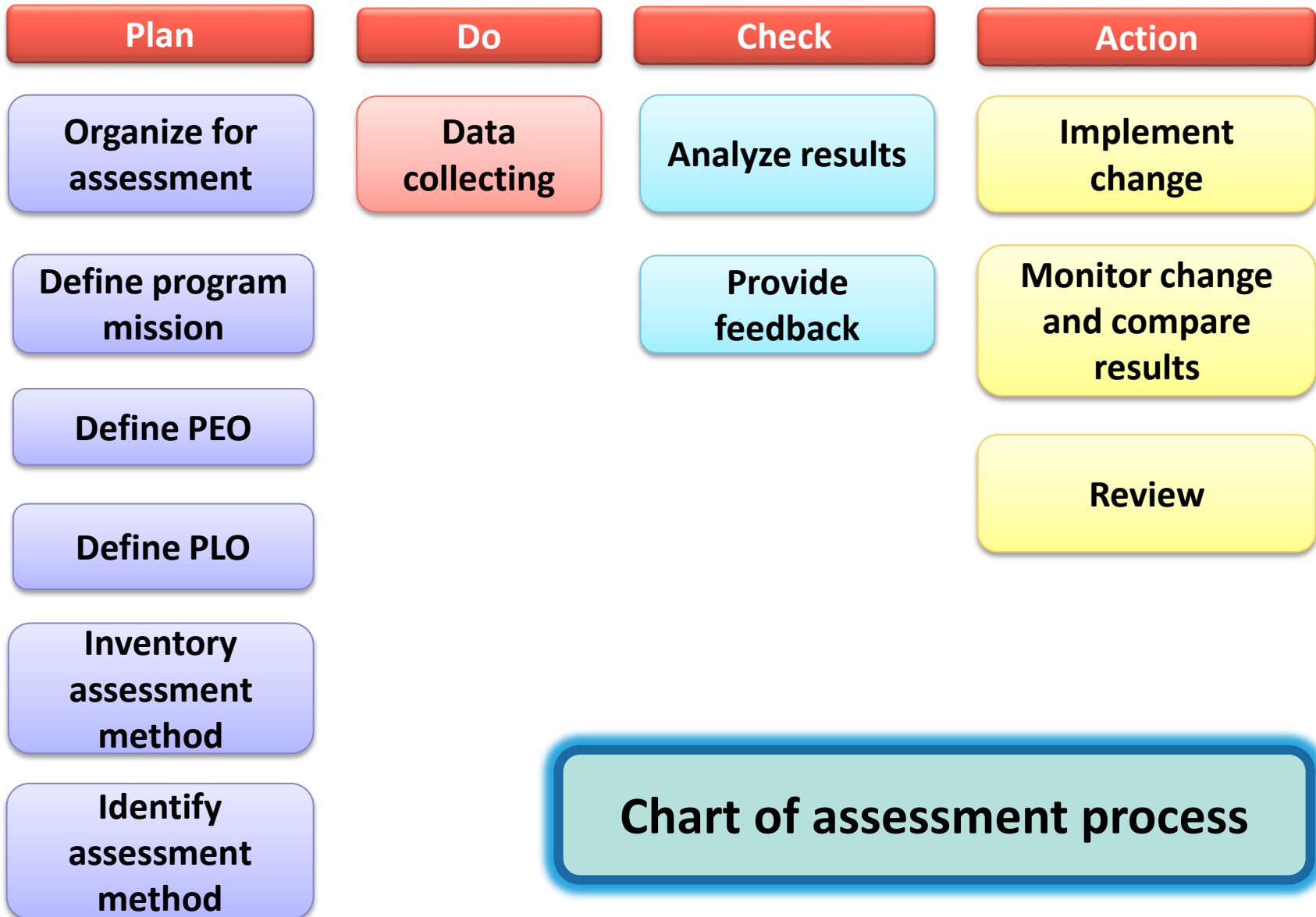
Course grade focus on measuring the performance of individual students, not the overall effectiveness of the program

Course grade generally can not satisfy the characteristics of good measures

Course grade does not indicate separately how well students have attained the different generic graduate outcomes such as critical thinking, creative problem solving or teamwork skills, even if such skills are assessed

# Outcomes assessment is a continuous process





# Assesmen Plan

Program Learning Outcomes	18/ 19	19/ 20	20/ 21	21/ 22	22/ 23	23/ 24
Mampu menunjukkan pengetahuan tentang konsep-konsep fisika klasik dan fisika modern melalui <b>identifikasi</b> sifat-sifat fisis dari suatu sistem fisis.	X		X		X	
Dapat <b>memformulasi</b> sistem fisis standar ke dalam model fisis dengan menggunakan matematika.	X		X		X	
Dapat <b>memecahkan masalah</b> suatu sistem fisis standar secara komprehensif menggunakan matematika dan perangkat komputasi.	X		X		X	
Dapat <b>menganalisis</b> sistem fisis dengan mengaplikasikan matematika dan perangkat komputasi/ICT.	X		X		X	
Dapat <b>mendesain dan melaksanakan</b> eksperimen dalam bidang fisika atau bidang lain terkait fisika, serta dapat mengolah, menganalisis, dan menginterpretasi data yang diperoleh.	X		X		X	

# Assessment Methods

- Multiple methods & sources recommended (increase validity)
- One method does NOT fit ALL (each has pros & cons)
- Practicality? Time, effort, money
- Do not have to measure everything or everybody (sampling)
- Capitalize on what you are already doing

# Direct vs. indirect measurements

- **Direct measures:** Assess student **knowledge** or skills of course/ program learning outcomes
- **Indirect measures:** Assess students' learning **experiences or perceptions** of their learning

# Inventory: Direct and indirect method

## Direct (Required)

- Class Assignments: paper, presentation, report...
- Capstone Project
- Direct Observation
- Portfolios
- External examiner
- Standardized exam
- Certification and licensure exams
- Theses/Senior papers

## Indirect (Supplemental)

- Surveys
  - Student survey
  - Alumni survey
  - Employer survey
- Interview
- Focus group
- Case study



Terima kasih