

271

**KONTRAK PERKULIAHAN**  
**CARIS-CARIS BESAR PROGRAM PENGAJARAN**  
**SATUAN ACARA PENGAJARAN**

**TEORI PERSAMAAN DIFERENSIAL**

**KODE MATA KULIAH: PAM 413**

**3 SKS**

**SEMESTER VI**



**OLEH :**

**Drs. Sutimin, M.Si**  
**Drs. Kartono, M.Si**

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**PROGRAM STUDI MATEMATIKA**  
**FAKULTAS MIPA**  
**UNIVERSITAS DIPONEGORO**  
**SEMARANG**

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
 KODE : MAT 217  
 SKS : 3  
 Waktu Pertemuan : 150 menit, minggu I

### A. TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan konsep-konsep barisan fungsi riil.

### 2. T I K

1. Mahasiswa mampu menjelaskan barisan fungsi yang konvergen uniform.
2. Mahasiswa mampu menjelaskan barisan fungsi yang konvergen titik demi titik.
3. Mahasiswa mampu menjelaskan Teorema tes-M Weierstrass.

B. POKOK BAHASAN : Barisan fungsi real

C. SUB POKOK BAHASAN: Konvergen uniform, konvergen titik demi titik

D. KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board, OHP, Papan tulis
PENYAJIAN	1. Menjelaskan konsep barisan fungsi. 2. Menjelaskan konsep barisan fungsi konvergen uniform. 3. Menjelaskan konsep barisan fungsi konvergen titik demi titik. 4. Menjelaskan Teorema tes-M Weierstrass	Memperhatikan	White board, OHP, Papan tulis
PENUTUP	1. Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E. EVALUASI : Tugas tugas, test formatif, tanya jawab, untuk mengukur keberhasilan materi kuliah

F. REFERENSI:

1. Sheply L. Ross, *Differensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd New Delhi

1. Sheply L. Ross, *Differensial Equations*, 1984, John Wiley & Sons Inc.

### SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
 KODE : MAT 217  
 SKS : 3  
 Waktu Pertemuan : 150 menit, minggu II

#### A. TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan konsep fungsi dua variabel riil dan syarat Lipschitz.

#### 2. T I K

1. Mahasiswa mampu menjelaskan fungsi dua variabel yang kontinu.
2. Mahasiswa mampu menjelaskan fungsi dua variabel yang terbatas pada daerah segi empat bidang datar.
3. Mahasiswa mampu menjelaskan fungsi dua variabel yang memenuhi syarat Lipschitz.

B. POKOK BAHASAN : Fungsi dua variabel

C.SUB POKOK BAHASAN : Fungsi kontinu, syarat Lipschitz.

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan konsep fungsi dua variable yang kontinu. 2.Manjelaskan fungsi dua variabel yang memenuhi syarat Lipschitz.	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan		

	2. Memberi tugas		
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E. EVALUASI :Tugas tugas,test formatif,tanya jawab,untuk mengukur keberhasilan materi kuliah

F. REFERENSI:

1. Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd New Delhi

### SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL

KODE : MAT 217

SKS : 3

Waktu Pertemuan : 150 menit, minggu III

#### A.TUJUAN

2. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan Teorema Dasar Keberadaan Solusi.

#### 3. T I K

1. Mahasiswa mampu menjelaskan dan membuktikan teorema dasar keberadaan solusi dari suatu persamaan diferensial orde satu.
2. Mahasiswa mampu menyelesaikan persamaan diferensial berdasarkan teorema dasar.

B. POKOK BAHASAN : Keberadaan Solusi

C.SUB POKOK BAHASAN:Teorema Dasar Keberadaan Solusi

#### D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan dan membuktikan teorema dasar keberadaan solusi dari persamaan diferensial orde satu. 2. Menjelaskan dan menyelesaikan	Memperhatikan	White board,OHP,Papan tulis

	persamaan diferensial berdasarkan Teorema Dasar Keberadaan Solusi.		
PENUTUP	1. Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

F. EVALUASI : Tugas tugas, test formatif, tanya jawab, untuk mengukur keberhasilan materi kuliah

G. REFERENSI:

1. Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd New Delhi

### SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL

KODE : MAT 217

SKS : 3

Waktu Pertemuan : 150 menit, minggu IV

A. TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan Teoerma Dasar Ketunggalan solusi dari persamaan diferensial orde satu.

2. T I K

1. Mahasiswa mampu menjelaskan syarat-syarat suatu persamaan diferensial mempunyai solusi tunggal yang memenuhi syraat batas tertentu.

2. Mahasiswa mampu penyelesaian persamaan diferensial untuk mengetahui bagaimana sifat-sifat solusinya.

B. POKOK BAHASAN : Teorema Dasar Ketunggalan

C.SUB POKOK BAHASAN: Ketunggalan solusi dari persamaan diferensial orde satu.

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board, OHP, Papan

			tuilis
PENYAJIAN	1. Menjelaskan syarat untuk ketunggalan solusi dari persamaan diferensial orde satu. 2. Menyelesaikan persamaan diferensial orde satu dengan berdasarkan syarat yang dipenuhi.	Memperhatikan	White board, OHP, Papan tulis
PENUTUP	1. Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E. EVALUASI : Tugas tugas, test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

F. REFERENSI:

1. Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi

### SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL

KODE : MAT 109

SKS : 3

Waktu Pertemuan : 150 menit, minggu V

#### A TUJUAN

1. T I U: Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan solusi yang terdefinisi pada domain tak terbatas.
2. T I K :
  - 1- Mahasiswa mampu menjelaskan keberadaan solusi yang terdefinisi pada domain tak terbatas.
  - 2 Mahasiswa mampu menyelesaikan persamaan diferensial pada domain tak terbatas.

B. POKOK BAHASAN : Kekontinuan Solusi

C. SUB POKOK BAHASAN: Kekontinuan solusi yang terdefinisi pada domain tak terbatas.

D. KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan keberdaan solusi kontinu pada interval terbuka. 2.Manjelaskan keberadaan solusi pada interval tak terbatas.	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

F REFERENSI:

1. Sheply L. Ross, *Differensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

### SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL

KODE : MAT 109

SKS : 3

Waktu Pertemuan : 150 menit, minggu VI

#### A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan solusi persamaan diferensial yang bergantung pada syarat awal.

2. T I K :

1. Mahasiswa mampu menjelaskan dan membuktikan ketunggalan solusi yang bergantung pada syarat awal tertentu.
2. Mahasiswa mampu mengidentifikasi solusi dengan memperhatikan syarat awal yang diberikan.

B. POKOK BAHASAN : Ketergantungan solusi

C.SUB POKOK BAHASAN: Ketergantungan solusi pada syarat awal

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan solusi persamaan diferensial dengan syarat awal yang diberikan. 2.Membuktikan ketunggalan solusi yang bergantung pada syarat awal. 3. Memberikan contoh	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

F REFERENSI:

3. Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
4. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

### SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL

KODE : MAT 109

SKS : 3

Waktu Pertemuan :150 menit, minggu VII

A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan solusi persamaan diferensial yang bergantung pada fungsi.
2. T I K :
  1. Mahasiswa mampu menjelaskan dan membuktikan ketunggalan solusi yang bergantung pada fungsi yang diberikan.
  2. Mahasiswa mampu mengidentifikasi solusi dengan memperhatikan fungsi yang diberikan.



3. mahasiswa mampu menjelaskan keberadaan dan ketunggalan solusi dari persamaan diferensial orde yang lebih tinggi.
4. Mahasiswa mampu mengidentifikasi solusi dari persamaan diferensial orde dua dan tiga.

B. POKOK BAHASAN : Ketergantungan solusi dan Teorema solusi persamaan diferensial orde lebih tinggi

C.SUB POKOK BAHASAN: Ketergantungan solusi pada fungsi yang diberikan

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Menjelaskan TIK dan relevansi	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	<ol style="list-style-type: none"> <li>1.Menjelaskan solusi persamaan diferensial dengan mengubah fungsi yang diberikan.</li> <li>2.Membuktikan ketunggalan solusi yang bergantung pada fungsi.</li> <li>3. Menjelaskan teorema keberadaan solusi dari persamaan diferensial orde 2</li> <li>4. Menjelaskan teorema ketunggalan solusi persamaan diferensial orde 2</li> </ol>	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	<ol style="list-style-type: none"> <li>1.Meminta mhs menjelaskan kembali dan membenarkan</li> <li>2. Memberi tugas</li> </ol>		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

F REFERENSI:

5. Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
6. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
KODE : MAT 109  
SKS : 3  
Waktu Pertemuan : 150 menit, minggu VIII

### A TUJUAN

1. T I U : Setelah menyelesaikan mata kuliah ini, mahasiswa mampu menyelesaikan Mid Test MSB.
2. TIK : Setelah mempelajari materi, mahasiswa dapat menyelesaikan soal-soal mid test TPD

B. Pokok Bahasan: Mid test

C. Sub Pokok Bahasan:

- Soal-soal mid test materi minggu ke 1- ke7

### D. Kegiatan Belajar Mengajar:

Tahap	Kegiatan Pengajar	Kegiatan Mahasiswa	Media & Alat
Pendahuluan	Menjelaskan tat cara mid test dan membagikan lembar soal dan kertas jawaban.	Mendengarkan	Papan tulis
Penyajian	Memberikan soal-soal mid test	Mengerjakan soal-soal mid test.	Lembar kertas.
Penutup	Menjelaskan ringkasan penyelesaian mid test.	Mencatat .	Buku catatan dan papan tulis.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL

KODE : MAT 109

SKS : 3

Waktu Pertemuan : 150 menit, minggu IX

### A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan perilaku solusi tanpa mengetahui solusinya secara eksplisit.

### 2. T I K :

1. Mahasiswa mampu menjelaskan dan menggambar bidang fase.

B. POKOK BAHASAN : Bidang Fase

C.SUB POKOK BAHASAN: Pengertian dan cara menggambar bidang fase.

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Mengulang pengertian sistem persamaan diferensial linier	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan sistem persamaan diferensial otonom. 2.Mejelaskan penhgertian bidang fase. 3. Menjelaskan cara menggambar bidang fase. 4. Memberikan contoh	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

### F REFERENSI:

- 1 Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
KODE : MAT 109  
SKS : 3  
Waktu Pertemuan : 300 menit, minggu X, XI

### A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan perilaku solusi .

2. T I K : Mahasiswa mampu menjelaskan jenis-jenis titik kritis.

B. POKOK BAHASAN : Titik kritis

C.SUB POKOK BAHASAN: Definisi dan jenis-jenis titik kritis.

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Mengulang pengertian sistem persamaan diferensial linier	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan titik kritis sistem persamaan diferensial otonom. 2.Mejelaskan jenis-jenis titik kritis. 3. Memberikan contoh	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

### F REFERENSI:

1. Sheply L. Ross, *Differential Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
 KODE : MAT 109  
 SKS : 3  
 Waktu Pertemuan : 300 menit, minggu XII, XIII

### A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan perilaku solusi .
  2. T I K : Mahasiswa mampu menjelaskan jenis-jenis kestabilan titik kritis.
- B. POKOK BAHASAN : Kestabilan titik kritis sistem pers. dif. linier  
 C.SUB POKOK BAHASAN: Definisi dan jenis-jenis kestabilan titik kritis.  
 D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Mengulang pengertian sistem persamaan diferensial linier	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan definisi kestabilan titik kritis sistem persamaan diferensial otonom. 2.Mejelaskan jenis-jenis kestabilan titik kritis. 3. Memberikan contoh	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

### F REFERENSI:

1. Sheply L. Ross, *Differensial Equations*, 1984, John Wiley & Sons Inc.
3. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
KODE : MAT 109  
SKS : 3  
Waktu Pertemuan : 150 menit, minggu XIV

### A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan perilaku solusi .
2. T I K : Mahasiswa mampu menjelaskan jenis-jenis titik kritis.

B. POKOK BAHASAN : Titik kritis sistem pers. dif. non linier

C.SUB POKOK BAHASAN: Definisi dan jenis-jenis titik kritis.

D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Mengulang pengertian titik kritis sistem persamaan diferensial linier	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan titik kritis sistem persamaan diferensial nonlinier 2.Mejelaskan jenis-jenis titik kritis. 3. Memberikan contoh	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

### F REFERENSI:

1. Sheply L. Ross, *Diferensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
KODE : MAT 109  
SKS : 3  
Waktu Pertemuan : 150 menit, minggu XV

### A TUJUAN

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menjelaskan perilaku solusi .
  2. T I K : Mahasiswa mampu menjelaskan jenis-jenis dan kestabilan titik kritis.
- B. POKOK BAHASAN : Kestabilan titik kritis sistem pers. dif. non linier  
C.SUB POKOK BAHASAN: Definisi dan jenis-jenis kestabilan titik kritis.

### D.KEGIATAN BELAJAR MENGAJAR

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Mengulang pengertian titik kritis sistem persamaan diferensial linier	Memperhatikan	White board,OHP,Papan tulis
PENYAJIAN	1.Menjelaskan kestabilan titik kritis sistem persamaan diferensial nonlinier 2.Mejelaskan jenis-jenis kestabilan titik kritis. 3. Memberikan contoh	Memperhatikan	White board,OHP,Papan tulis
PENUTUP	1.Meminta mhs menjelaskan kembali dan membenarkan 2. Memberi tugas		

E EVALUASI :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

### F REFERENSI:

1. Sheply L. Ross, *Differensial Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

## SATUAN ACARA PENGAJARAN

MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL  
 KODE : MAT 109  
 SKS : 3  
 Waktu Pertemuan : 150 menit, minggu XVI

**A TUJUAN**

1. T I U : Setelah mengikuti mata kuliah ini mahasiswa mampu menyelesaikan soal-soal evaluasi tahap kedua.
2. T I K : Mahasiswa mampu menyelesaikan soal-soal materi minggu 9-15.

**B. POKOK BAHASAN** : Evaluasi tahap kedua.

**C.SUB POKOK BAHASAN:** Soal-soal ujian tahap kedua.

**D.KEGIATAN BELAJAR MENGAJAR**

TAHAP KEGIATAN	KEGIATAN PENGAJAR	KEGIATAN MAHASISWA	MEDIA
PENDAHULUAN	Mengatur pelaksanaan evaluasi	Mengerjakan	Lembar jawab
PENYAJIAN	1.memberikan soal-soal evaluasi 2.mengawasi pelaksanaan ujian	Mengerjakan	Lembar jawab
PENUTUP	Menjelaskan pelaksanaan ujian akhir semester terjadwal,		

**E EVALUASI** :Tugas tugas,test formatif, tanya jawab, utk mengukur keberhasilan materi kuliah

**F REFERENSI:**

1. Sheply L. Ross, Differensial Equations, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.



## KONTRAK PERKULIAHAN

**MATA KULIAH : TEORI PERSAMAAN DIFERENSIAL**

**KODE : MAT 109**

**SKS/ SEMESTER : 3 /**

### **I. Tujuan dan Manfaat mata kuliah**

Matematika adalah alat bantu untuk menyelesaikan masalah masalah sehari hari yang sering diekspresikan dalam bentuk persamaan diferensial. Teori persamaan diferensial adalah cabang matematika yang berisi beberapa konsep-konsep dan teorema yang menjelaskan keberadaan solusi dari suatu sistem persamaan diferensial dan penyelesaian secara kualitatifnya.

Oleh sebab itu mata kuliah ini ditawarkan untuk dapat diketahui dan digunakan untuk menyelesaikan masalah yang nyata terutama dalam bidang ekologi, biologi dan fisika.

### **II. Diskripsi Perkuliahan**

Mata kuliah ini merupakan dasar teori yang menjelaskan perilaku solusi dari suatu persamaan diferensial, untuk mengetahui sifat-sifat dan solusi dari persamaan diferensial tersebut. Mata kuliah ini sebagai dasar pengembangan sistem dinamik yang menjelaskan perubahan kualitatif dan analitik terhadap waktu dari suatu sistem yang menjelaskan suatu fenomena fisik. Perubahan ini dapat dianalisis dari solusi dari persamaan sistem tersebut, maupun melalui analisis kestabilan dari solusi atau kestabilan solusi kesetimbangan.

### **III. Tujuan Instruksional**

#### **Tujuan Instruksional Umum (TIU)**

Setelah selesai mengikuti mata kuliah Teori Persamaan Diferensial ini mahasiswa diharapkan akan dapat menjelaskan dan menyelesaikan serta menganalisis suatu

persamaan diferensial dan sistem persamaan diferensial. Selanjutnya menginterpretasikan bagaimana perilaku dinamika dari persamaan diferensial dan sistem persamaan diferensial tersebut.

#### **Tujuan Instruksional Khusus (TIK)**

1. Mahasiswa akan dapat menjelaskan masalah solusi dari persamaan diferensial dan sistem persamaan diferensial.
2. Mahasiswa akan dapat menyelesaikan masalah perubahan perilaku kualitatif dari persamaan diferensial dan sistem persamaan diferensial.
3. Mahasiswa akan dapat menganalisis perubahan analitik dari sistem persamaan diferensial.

#### **IV. Strategi Perkuliahan**

- + Metode Perkuliahan dengan ceramah, diskusi, dan latihan soal
- + Estimasi waktu 150 menit
  - 90 menit memberikan uraian tentang pokok bahasan
  - 30 menit memberikan contoh permasalahan dan penyelesaiannya
  - 30 menit latihan soal dan diskusi
- + Jumlah mahasiswa kurang lebih 50 orang
- + Tiap kelompok diskusi terdiri dari 5-7 mahasiswa
- + Masalah/Topik diskusi
  1. Syarat Lipschitz
  2. Keberadaan Solusi
  3. Ketunggalan Solusi

#### **V. Bahan Bacaan**

1. Shepley L. Ross, *Differential Equations*, 1984, John Wiley & Sons Inc.
2. Earl A. Coddington, Norman Levinson, 1980, Tata Mc Graw-Hill, Publ.Co.Ltd, New Delhi.

#### **VI. Tugas**

1. Menyelesaikan pekerjaan rumah yg diberikan baik secara mandiri maupun kelompok selesai kuliah.

## VII. Kriteria Penilaian.

Kriteria penilaian yg digunakan adalah :

1. Nilai A : 4
2. Nilai AB : 3,5
3. Nilai B : 3
4. Nilai BC : 2,5
5. Nilai C : 2
6. Nilai CD : 1,5
7. Nilai D : 1
8. Nilai E : 0

Dalam menentukan nilai akhir akan menggunakan pembobotan sebagai berikut

1. Tugas : 20 %
2. Evaluasi tengah semester : 40%
3. Evaluasi akhir semester : 40 %

## VIII. Jadwal perkuliahan

Tatap Muka	TOPIK BAHASAN	BACAAN
1	Konsep barisan fungsi real, kekonvergenan barisan, Teorema tes-M Weiertrass	Buku 1
2	Konsep fungsi dua variabel kontinu, syarat Lipschitz.	Buku 1 dan buku 2
3	Teorema dasar keberadaan solusi dari persamaan diferensial orde satu.	Buku 1 dan buku 2
4	Teorema dasar ketunggalan solusi dari persamaan diferensial orde satu	Buku 1 dan buku 2
5	Keberadaan solusi kontinu pada interval terbuka dan interval tak terbatas.	Buku 1 dan 2
6	Solusi persamaan diferensial dengan syarat awal yang diberikan, ketunggalan solusi yang bergantung pada syarat awal.	Buku 1 dan buku 2
7	Solusi persamaan diferensial dengan mengubah fungsi yang diberikan, ketunggalan solusi yang bergantung pada fungsi. Keberadaan solusi dari persamaan diferensial orde 2 , ketunggalan solusi persamaan diferensial orde 2	Buku 1, buku 2

8	Mid Semester	Buku 1, buku 2
9	Pengertian dan cara menggambar bidang fase.	Buku 1, buku 2
10	Definisi dan pengertian titik kritis	Buku 1, buku 2
11	Jenis-jenis titik kritis.	Buku 1, buku 2
12	Definisi Kestabilan titik kritis sistem pers. dif. Linier	Buku 1, buku 2
13	Jenis-jenis kestabilan titik kritis.	Buku 1, buku 2
14	Definisi dan jenis-jenis titik kritis sistem pers. dif. non linier	Buku 1, buku 2
15	Definisi dan jenis-jenis kestabilan titik kritis pers. diferensial non linier	Buku 1, buku 2
16	UJIAN SEMESTER	

## GARIS GARI BESAR PROGRAM PENGAJARAN

Nama Mata Kuliah : Theory of Differential Equation (TPD)

Kode Mata Kuliah/SKS : PAM 413 / 3

Deskripsi Singkat : Matematika adalah salah satu ilmu matematika yang menyelesaikan masalah-masalah yang berbentuk persamaan diferensial. Teori persamaan diferensial adalah cabang ilmu Matematika yang meliputi konsep dan teorema-teorema yang menjelaskan keberadaan dan ketunggalan solusi dari system persamaan diferensial atau solusi kualitatifnya. Kuliah ini ditawarkan untuk mengetahui dan digunakan untuk menyelesaikan masalah-masalah dunia.

### General Instructional Objective:

Setelah menyelesaikan kuliah ini, mahasiswa diharapkan mampu menjelaskan , meyelesaikan dan enganalisis perilaku system persamaan diferensial. Dan juga the mahasiswa mampu menginterpretasikan bagaimana perilaku system persamaan diferensial.

No	Tujuan Instruksional Khusus	Topik	Sub Topik	Waktu	Buku Rujukan
1	Dengan diberikan deskripsi singkat tentang mata kuliah dan kontrak kuliah ini, mahasiswa diharapkan dapat memahami substansi pembahasan dan aturan-aturan pelaksanaan perkuliahan.	Pendahuluan: deskripsi mata kuliah dan aturan pelaksanaan perkuliahan	- Deskripsi mata kuliah dan kaitannya dengan mata kuliah lain dan aplikasinya - Penjelasan SAP, GBPP, Kontrak kuliah	150 Mnt	SAP, GBPP, Kontrak Kuliah
2	Mahasiswa mampu menjelaskan konsep barisan function real yang convergen	barisan function real yang convergen	Konsep barisan function real yang convergen	150 minutes	[1], [2]

3	Mahasiswa mampu menjelaskan konsep kontinuitas fungsi real dua variable, syarat Lipschitz	kontinuitas fungsi real	kontinuitas fungsi real dua variable, syarat Lipschitz	150 minut es	[1], [2]
4	Mahasiswa mampu menjelaskan konsep teorema dasar keberadaan solusi dari persamaan diferensial orde pertama	teorema dasar keberadaan solusi	Teorema dasar keberadaan solusi dari persamaan diferensial orde pertama	150 minut es	[1], [2]
5	Mahasiswa mampu menjelaskan konsep teorema dasar keberadaan dan ketunggalan solusi dari persamaan diferensial orde pertama	Teorema dasar keberadaan dan ketunggalan solusi	Konsep teorema dasar keberadaan dan ketunggalan solusi	150 minut es	[1], [2]
6	Mahasiswa mampu menjelaskan konsep teorema dasar keberadaan dan ketunggalan solusi pada intervalterbuka dan taktebatas	Teorema dasar keberadaan dan ketunggalan solusi	Konsep teorema dasar keberadaan dan ketunggalan solusi pada intervalterbuka dan taktebatas	150 minut es	[1], [2]
7	Mahasiswa mampu menjelaskan solusi dan ketunggalannya dari persamaan diferensial dengan memberikan syarat awal	Solusi dan ketunggalan	Solusi dan ketunggalannya dari persamaan diferensial dengan memberikan syarat awal	150 minut es	[1], [2]
8	Mahasiswa mampu menjelaskan keberadaan dan ketunggalan solusi bergantung fungsi	Keberadaan dan ketunggalan	keberadaan dan ketunggalan solusi bergantung fungsi	100 minut es	[1], [2]
9	Mahasiswa mampu menjelaskan keberadaan dan ketunggalan solusi dari persamaan diferensial orde kedua	Keberadaan dan ketunggalan	Keberadaan dan ketunggalan solusi dari persamaan diferensial orde kedua	150 minut es	[1], [2]
10	Mahasiswa mampu	Bidang fase	Pengertian	150	[1], [2]

	menjelaskan dan menggambarkan system persamaan diferensial pada bidang phase		dan cara menggambar pada bidang fase	minut es	
11	Mahasiswa mampu menjelaskan dan memahami titik kritis	Titik kritis	Pengertian titik kritis.	150 minut es	[1]. [2]
12	Mahasiswa mampu memahami dan menganalisis kestabilan titik kritis	Stabilitas titik kritis	Pengertian titik kritis	150 minut es	[1], [2]
13	Mahasiswa memahami dan menganalisis kestabilan titik kritis untuk persamaan diferensial tak linier	Analisis stabilitas	Analisis stabilitas titik kritis	150 minut es	[1], [2]
14	Mahasiswa mampu menyelesaikan latihan dan ujian akhir semester	Test	Ujian Semester	100 minut es	[1], [2]

References:

1. Boyce, W.E, Richard C.DiPrima, *Elementary Differential Equations and Boundary Value Problems*, fifth edition, John Wiley & Sons, Inc, New York, 1992
2. Haberman, R., *Elementary Applied Partial Differential Equations: with fourier series and baoundary value problems*, Second Edition, Prentce-Hall International Editions, Singapore 1987.
3. Kartono, *Maple untu Persamaan Diferensial*, edisi 2, Graha Ilmu, Yogyakarta, 2005

LECTURING PROGRAM UNIT

CHEMISTRY STUDY PROGRAM

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DIPONEGORO UNIVERSITY  
SEMARANG





## LECTURING PROGRAMME UNIT

Course : **Physical Biochemistry**  
 Code/SKS : PAK 354/2  
 Allocation times : 1 X 100 Minutes  
 Session : 2

**A. Aims**

**Standard of Competencies** : The students are able to apply physical biochemistry theory in the process of macromolecules as well as biological processes.

**Basic Competencies** : The student in sixth semester are able to explain structure and thermodynamic of macromolekul with truthness 80% minimally

**B. Topics** : Struktur and Dinamic of makromolekular

**C. Sub Topics** : 1. Three dimation structure of protein and nucleatic acid  
2. Termodinamic of Makromolekul

**D. Lecturing activities:**

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain of the discuss rule</li> <li>✓ Determine group that will present their paper base on its topic</li> <li>✓ Determine person who will be a moderator</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Monitoring and directing of discussion in such away to match as Standard of Competencies</li> <li>✓ Explain about formation of primer, sekunder, tersier and quarterner of protein structure</li> <li>✓ Explain about formation of primer, sekunder, tersier of nucleatic acid structure</li> <li>✓ Explain thermodynamically aspect of three dimension formation of protein and nucleatic acid</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some references in such away to get a more answers comprehensively</li> </ul>	Do solving of question and discuss of problem solving.	Lumbar jaw ban OHP, OHT, Whiteboard

**E. References:**

1. Van Holde, K.E., *et al.*, (1998), *Principles Physical Biochemistry*, Prentice-Hall, Inc., New Jersey.
2. Devlin, T.M., (1997), *Textbook of Biochemistry With Clinical Correlations*, Fourth Edition, Wiley-Liss, Inc, USA.



## LECTURING PROGRAMME UNIT

3. Rhodes, G., (2000), *Crystallography Made Crystal Clear: A Guide Users Of Macromolecular Models*, Second Edition, Academic Press, California.
4. Boyer, R.F., (1993), *Modern Experimental Biochemistry*, Second Edition, The Benjamin/Cummings Publishing Company, Inc, California.
5. Fersht, A., (2000), *Structure And Mechanism In Protein Science*, Third Printing, W.H. Freeman and Company, New York.
6. Lehninger, A.L., (1973), *Bioenergetics*, 2<sup>nd</sup> Edition, The Benjamin/Cummings Publishing Company, Inc, California.
7. Creighton, T.E., (1984), *Proteins: Structure And Molecular Principles*, W.H. Freeman and Company, New York.



## LECTURING PROGRAMME UNIT

Course : **Biochemistry I**  
 Code/SKS : PAK 351/3 SKS  
 Allocation times : 2 X 50 Minutes  
 Session : 1

**A. Aims**

**Standard of Competencies** : The students are able to apply biochemistry theory in the process of macromolecules as well as biological processes daily.

**Basic Competencies** : The student are able to explain: zat hidup characteristic, biochemistry in zat hidup, and able to identification of Biomolekul, Energy transformation, chemistry reaction in cell

**B. Topics**

**C. Sub Topics**

- : Phylosophy in biochemistry  
 : 1. Characteristics of zat hidup  
 : 2. Termodinamic of Makromolekul  
 : 3. Biomolecule  
 : 4. Energy transformation in cell

**D. Lecturing activities:**

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	✓ Give a resume about relation of macromolecule with phylosophy of biochemistry.	Prepare to discuss, so involve in discuss actively	OHP & OHT
<b>Presentation</b>	✓ Discuss phylosophy of biochemistry, and give some examples. ✓ Give some exercises.	Prepare to discuss, so involve in discuss actively	OHP & OHT
<b>Conclusion</b>	✓ Give summary of biochemistry phylosophy ✓ Gave some tasks and some matter that would be discussed.	Prepare to discuss, so involve in discuss actively	OHP & OHT

**E. Evaluation**

- : Quis, Individual task, Group task, mid test, final examination  
 Model of quis and home works question in essey form.  
 Individuals task is home work.  
 Groups task is a making paper with topic that have been determined.  
 Mid test and final examinations question in multiple choice form.



## LECTURING PROGRAMME UNIT

### F. References

1. Devlin, T.M., (1997), *Textbook of Biochemistry With Clinical Correlations*, Fourth Edition, Wiley-Liss, Inc, USA.
2. Brown, W.H., and Rogers, E. P., 1980, *General, Organic and Biochemistry*, Student Edition Wadsworth International, USA
3. Lehninger, (1977), *Biochemistry*, second edition, Worth Publisher, Inc, USA.
4. Mathews, C.K., and Van Holde, K.E., (1996), *Biochemistry*, second edition, The Benjamin/Cummings Publishing Company, Inc, California, USA.
5. Stryer L., (1988), *Biochemistry*, third edition, WH Freeman and Company, New York, USA.
6. Trehan, K., 1987, *Biochemistry*, Willy Eastern Limited, New Delhi.
7. Voet, D., and Voet, J.G., (1990), *Biochemistry*, John Wiley and Sons, New York, USA.
8. Wirahadikusumah M, (1985), *Biokimia: Protein, Enzim, dan Asam Nukleat*, Penerbit ITB, Bandung
9. Wuryanti, 1999, *Buku Pegangan Kuliah Mahasiswa Bagian A, Lab. Biokimia, Jurusan Kimia FMIPA UNDIP, Semarang, Indonesia.*



## LECTURING PROGRAMME UNIT

Course : **Biochemistry II**  
 Code/SKS : PAK 352/3 SKS  
 Allocation times : 1 X 150 Minutes  
 Session : 14

**A. Aims**

**Standard of Competencies** : The students are able to connect of metabolism, genetic and immune system with process that take place in human being body

**Basic Competencies** : The student in sixth semester are able to explain antibody structure and function in human being immun system with truthness 80%.

**B. Topics**

: Immunochemistry

**C. Sub Topics**

1. Antibody and immun responsive
2. Antibody structure
3. Cellular mechanism of antibody formation

**D. Lecturing activities:**

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain of the discuss rule</li> <li>✓ Determine group that will present their paper base on its topic</li> <li>✓ Determine person who will be a moderator</li> </ul>	Prepare to discuss, so involve in discuss actively	Handout OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Monitoring and directing of discussion in such away to match as Standard of Competencies</li> <li>✓ Explain about fundamental concept of antibody and body imun system</li> <li>✓ Explain about interaction mechanism antygen and antibody.</li> <li>✓ Explain about mechanism of antibody formation.</li> <li>✓ Give some cases of body imun system formation, eg. Vaccination</li> </ul>	Prepare to discuss, so involve in discuss actively	Handout OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some referrences in such away to get a more answers comprehensively</li> </ul>	Do solving of question and discuss of problem solving .	Handout, Answering paper, OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

### E. References

1. Devlin, T.M., (1997), *Textbook of Biochemistry With Clinical Correlations*, Fourth Edition, Wiley-Liss, Inc, USA.
2. Lehninger, (1977), *Biochemistry*, second edition, Worth Publisher, Inc, USA.
3. Mathews, C.K., and Van Holde, K.E., (1996), *Biochemistry*, second edition, The Benjamin/Cummings Publishing Company, Inc, California, USA.
4. Stryer L., (1988), *Biochemistry*, third edition, USA.
5. Voet, D., and Voet, J.G., (1990), *Biochemistry*, John Wiley and Sons, New York, USA.
6. Wirahadikusumah M, (1985), *Biokimia: Protein, Enzim, dan Asam Nukleat*, Penerbit ITB, Bandung
7. Wirahadikusumah M, (1985), *Biokimia: Metabolisme Energi, Karbohidrat, dan Lipid*, Penerbit ITB, Bandung



## LECTURING PROGRAMME UNIT

Course : Medical Biochemistry  
Code/SKS : PAK 356/ 2 SKS  
Allocation times : 1 X 50 Minutes  
Session : 1

A. Aims

**Standard of Competencies** : The students are able to explain mechanism and interaction drug with body cell.

**Basic Competencies**

: The student are able to explain relation of drug and healthy.

B. Topics

: Relation drug and healthy.

C. Sub Topics

: 1. Term of drug and healthy  
2. Drug Function

D. Lecturing activities:

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	✓ Give a resume about relation chemistry with drug and healthy	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	✓ Explain relation drug and healthy ✓ Give some examples. ✓ Give some exercises	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard
<b>Conclusion</b>	✓ Give a summary about relation chemistry with drug and healthy ✓ Give some task and some matter that would be discussed.	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

Course : Medical Biochemistry  
 Code/SKS : PAK 356/ 2 SKS  
 Allocation times : 2 X 50 Minutes  
 Session : 3

**A. Aims**

**Standard of Competencies** : The students are able to explain mechanism and interaction drug with body cell.

**Basic Competencies** : The student in fifth semester are able to explain drug metabolism in body human being.

**B. Topics** : Drug metabolism in body human being.

**C. Sub Topics** : 1. Adsorption, distribution, metabolism and drug exskretion  
 2. Defect of drug metabolism in body human being.

**D. Lecturing activities:**

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain range of drug line in human being body.</li> <li>✓ Explain advantage of drug study in body</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Explain drug line in human being body.</li> <li>✓ Explain mechanism of drug adsorption</li> <li>✓ Explain mechanism of drug distribution</li> <li>✓ Explain mechanism of drug metablism</li> <li>✓ Explain mechanism of drug exretion</li> <li>✓ Explain mechanism of drug deffection in body</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some referrences in such away to get a more answers comprehensivel</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard





## LECTURING PROGRAMME UNIT

E. Evaluation : Quis, Individual task, Group task, mid test, final examination  
Model of quis and home works question in essay form.  
Individuals task is home work.  
Groups task is a making paper with topic that have been determined.  
Mid test and final examinations question in multiple choice form

### F. References

1. Foye, W., (1988), *Kimia Medisinal*, UGM Press, Yogyakarta
2. Suryohudoyo, P., (2000), *Kapita Selekt: Ilmu Kedokteran Molekuler*, Sagung Seto, Jakarta.
3. Devlin, T.M., (1997), *Textbook of Biochemistry With Clinical Correlations*, Fourth Edition, Wiley-Liss, Inc, USA.
4. Strachan, T., dan Read, A.P., (1999), *Human Molecular Genetics 2*, Second Edition, Wiley-Liss, Inc., New York.
5. Luduena, R.F., (1995), *Learning Biochemistry: 100 Case Oriented Problems*, Wiley-Liss, Inc., New York.



## LECTURING PROGRAMME UNIT

Course : **Biotechnology**  
 Code/SKS : PAK 451/ 2 SKS  
 Allocation times : 2 X 50 Minutes  
 Session : 1

A. Aims

**Standard of Competencies** : The students are able to apply biotechnology theory in laboratory scale.

**Basic Competencies** : Explain structure and function of cell membrane.

B. Topics : Biochemistry of cell membrane.

C. Sub Topics : 1. Structure and function of cell membrane  
 2. System of cell membrane transport.  
 3. Other function of biomembrane

D. Lecturing activities:

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	✓ Give a resume about relation biochemistry with cell membrane that aims to explain their relations	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	✓ Explain biochemistry of cell membrane ✓ Give some examples ✓ Give some exercises	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard,
<b>Conclusion</b>	✓ Give a summary about relation chemistry with drug and healthy ✓ Give some task and some matter that would be discussed	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

Course : **Biotechnology**  
 Code/SKS : **PAK 451/ 2 SKS**  
 Allocation times : **2 X 50 Minutes**  
 Session : **5**

E. Aims

**Standard of Competencies** : The students are able to apply biotechnology theory in laboratory scale.

**Basic Competencies** : Order of some stage fermentation process

F. Topics : Fermentation technology

G. Sub Topics : 1. Define and Fermentation  
2. Medium of fermentation.  
3. Sterilization

H. Lecturing activities:

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain range of fermentation technology.</li> <li>✓ Explain ordering of fermentation process</li> <li>✓ Explain of Competencies Standart and Basic Competencies.</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Explain basic of fermentation concept</li> <li>✓ Explain of fermentation process</li> <li>✓ Explain medium of fermentation process</li> <li>✓ Explain methode of sterilization medium and tool fermentation</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard,
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers comprehensively</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

### E. Evaluation

- : Quis, Individual task, Group task, mid test, final examination  
Model of quis and home works question in essey form.  
Individuals task is home work.  
Groups task is a making paper with topic that have been determined.  
Mid test and final examinations question in multiple choice form

### F. Refferences:

1. Brown, T.A., 1995, *Gene Cloning: An Introduction*, 3 rd edition, Chapman & Hall.
2. Glick, B.R., and Pasternack, J.J., 1994, *Molecular Biotechnology*, ASM Press, Washington
3. Pelczar, M.J. dan Chan, E.C.S (1986), *Dasar-Dasar Mikrobiologi*, UI-Press, Jakarta
4. Prave, P., Faust, U., Sittig, W., and Sukatsch, D.A., 1987, *Basic Biotechnology: A Student's Guide*, Weiheim, New York, NY:VCH
5. Stanbury, P.F., and Whitaker, A., 1984, *Principles of Fermentation Technology*, 1 st edition, Pergamon Press, New York
6. Suharto, I., 1995, *Bioteknologi dalam Dunia Industri*, cetakan pertama, Andi Offset, Yogyakarta.



## LECTURING PROGRAMME UNIT

- Course : Technical of Biochemistry Research  
 Code/SKS : PAK 358/ 2 SKS  
 Allocation times : 2 X 50 Minutes  
 Session : 2
- A. Aims  
**Standard of Competencies** : The student are able to construct stage of isolation, purification and characterization of protein and DNA by using conventional and moern methode.
- Basic Competencies** : The student are able to defferent of procariote and eucariote properties, and explain of operation standart in biochemistry research
- B. Topics : Characteristic of Biochemistry research  
 C. Sub Topics : 1. Properties of procariote and eucariote cell  
 2. Properties of Biomolecule.  
 3. Working Savely in Biochemistry research

### D. Lecturing activities:

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain range characteristic of Biochemistry research.</li> <li>✓ Explain defferent of properties, structure, biomoleculer from procariote and eucariote cell</li> <li>✓ Explain of Competencies Standart and Basic Competencies</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Explain basic concept of procariote cell in properties and structure.</li> <li>✓ Explain basic concept of eucariote cell in properties and structurc</li> <li>✓ Explain properties bomolecule that compose cell.</li> <li>✓ Explain some rule that must been taken attention in Working savely.</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard, LCD
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers comprehensively</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard LCD



## LECTURING PROGRAMME UNIT

### E. References:

1. Pelczar, M.J. dan Chan, E.C.S (1986), *Dasar-Dasar Mikrobiologi*, UI-Press, Jakarta
2. Slamet Sudarmadji (1996), *Teknik Analisa Biokimia*, Liberty, Yogyakarta
3. Deutscher, M.P. (1990), *Guide to Protein Purification*, Academic Press Limited, London
4. Sambrook, J. and Russel D.W. (2001), *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory Press, New York
5. Glick, B.R. and Pasternak, J.J (1994), *Molecular Biotechnology: Principles and Applications of Recombinant DNA*, ASM Press, Washington



## LECTURING PROGRAMME UNIT

Course : Food Biochemistry  
 Code/SKS : PAK 353/ 2 SKS  
 Allocation times : 2 X 50 Minutes  
 Session : 1

**A. Aims**

**Standard of Competencies** : The student are able to identify of animals and herbal food matter and able to aplay some manners of food materials processing

**Basic Competencies** : The student are able to explain relation food materials with public

**B. Topics**

: Introduction

**C. Sub Topics**

: 1. Food material and public

**D. Lecturing activities:**

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	✓ Give some resume about relation macromolecule with introduction	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Discuss introduction</li> <li>✓ Give some examples.</li> <li>✓ Give some exercises.</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers comprehensively</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

Course : Food Biochemistry  
 Code/SKS : PAK 353/ 2 SKS  
 Allocation times : 2 X 50 Minutes  
 Session : 7

**A. Aims**

**Standard of Competencies** : The student are able to identify of animals and herbal food matter and able to aplay some manners of food materials processing

**Basic Competencies** : The student in fiveth semester are able to identify some contaminants, effect of additive substance and its effect to human healty

**B. Topics** : Some contaminants, effect of additive substance and its effect to human healty

**C. Sub Topics** : 1. Some additive substance  
 2. Effec of additive substance to human healty

**D. Lecturing activities**

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain range of additive substance</li> <li>✓ Explain role play and advantage to study of additive substance and its efect toward human healty.</li> <li>✓ Explain of Competencies Standart and Basic Competencies</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Explain term of additive substance.</li> <li>✓ Explain aims of using additive substance on food material</li> <li>✓ Explain role play of additive substance on food material</li> <li>✓ Explain kind of additive substance and theirs function</li> <li>✓ Give some examples healty disturbing by using additive material on food material</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give a summary about relation chemistry with drug and healty</li> <li>✓ Give some task and some matter that would be discussed</li> </ul>	Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard

**E. Evaluation** : Quis, Individual task, Group task, mid test, final examination  
 Model of quis and home works question in essey form.  
 Individuals task is home work.  
 Groups task is a making paper with topic that have been determined.  
 Mid test and final examinations question in multiple choice form





## LECTURING PROGRAMME UNIT

### F. Refferences:

1. Belitz, H.D., and Grosch, W., 1987, *Food Chemistry*, second edition, springer verlag, Berlin, Germany.
2. Buckle, K.A., Edwards, R.A., Fleet, G.H., dan Wooton, M., 1987, Ilmu Pangan, UI Press (penterjemah: Hari Purnomo dan Adiono).
3. deMan, J.M., 1997, Kimia Makanan, (penterjemah: Prof. Dr. Kosasih Padmawinata), edisi kedua, penerbit ITB, Bandung.
4. Frazier, W.C, and Westhoff, D.C., 1998, *Food Microbiology*, McGraw Hill Book Co., Singapore.
5. Prawirokusuma, S., 1991, Biokimia Nutrisi, edisi satu, BPFE, Yogyakarta.
6. Sediaoetama, A.J., 1989, Ilmu Gizi, jilid II, Penerbit Dian Rakyat, Jakarta.
7. Winarno, F.G., 1992, Kimia Pangan dan Gizi, Gramedia Pustaka Utama



## LECTURING PROGRAMME UNIT

Course : Biomolekuler  
 Code/SKS : PAK 453/ 2 SKS  
 Allocation times : 1 X 100 Minutes  
 Session : 3

**B. Aims**  
**Standard of Competencies** : The student are able to construc stages of recombinant DNA, cloning, and controle of gen expressions on procariote and eucariote cell as base on mastering the next time, this is a genetics technology.

**Basic Competencies** : The student in seventh semester are able to explain structure and fuction DNA, exhibizate role play restriction emzym, cloning vector, transformation motherhood cell on recombinant DNA technical with truethness 80 %

**B. Topics** : Technology of Recombinant DNA  
**C. Sub Topics** : 1. DNA: Structure and function  
 2. Clonning prosedure  
 3. Ristriction emzym  
 4. Clonning vector  
 5. Transformation of motherhood cell

### D. Lecturing activities

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain of the discuss rule</li> <li>✓ Determine group that will present their paper base on its topic</li> <li>✓ Determine person who will be a moderator</li> </ul>	Prepare to discuss, so involve in discuss actively	Handout OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Monitoring and directing of discuss about stage of gen clonning</li> <li>✓ Explain principal of gen isolation, DNA recombinant, cell transformation and schreening of recombinant cell.</li> </ul>	Take attent, writing, question_answer and discuss	Handout OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers comprehensively.</li> </ul>	Take attent, writing, question_answer and discuss	Handout, Answering paper, OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

Course : Biomolekuler  
 Code/SKS : PAK 453/ 2 SKS  
 Allocation times : 1 X 100 Minutes  
 Session : 4

C. Aims  
**Standard of Competencies** : The student are able to construc stages of recombinant DNA, clonning, and controle of gen expressions on procariote and eucariote cell as base on mastering the next time, this is a genetics technology.

**Basic Competencies** : The student in seventh semester are able to explain structure and fuction DNA, exhibizate role play restriction emzym, clonning vector, transformation motherhood cell on recombinant DNA technical with truethness 80 %

B. Topics : Technology of Recombinant DNA  
 C. Sub Topics :  
 1. DNA: Structure and function  
 2. Clonning prosedure  
 3. Ristriction emzym  
 4. Clonning vector  
 5. Transformation of motherhood cell

### D. Lecturing activities

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Explain of the discuss rule</li> <li>✓ Determine group that will present their paper base on its topic</li> <li>✓ Determine person who will be a moderator</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP, OHT, Whiteboard
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Monitoring and directing of discuss with topic as follow:</li> <li>✓ Explain function and kind of ristriction emzym, term of <i>blunt end</i> and <i>sticky end</i></li> <li>✓ Explain function and kind of lygase emzym, term of : <i>linkers, adaptors, homopolimer tailing.</i></li> <li>✓ Explain transformation stage of motherhood cell.</li> <li>✓ Explain stage recombinant cell shcreening.</li> </ul>	'Take attent, writing, question_answer and discuss	OHP, OHT, Whiteboard
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>✓ Give some questions (formatif test) and it must to be done in 10-15 minute</li> <li>✓ Task a student to answer some question and able to confront its with other student</li> <li>✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a</li> </ul>	Take attent, writing, question_answer and discuss	Lembar jawaban OHP, OHT, Whiteboard



## LECTURING PROGRAMME UNIT

Contents	Lecturing activities	Student activities	Lecturing media
	more answers comprehensively.		

### E. References

1. Brown, T.A., 1995, *Gene Cloning: An Introduction*, 3rd edition, Chapman & Hall.
2. Glick, B.R. and Pasternak, J.J (1994), *Molecular Biotechnology: Principles and Applications of Recombinant DNA*, ASM Press, Washington
3. Sambrook, J. and Russel D.W. (2001), *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory Press, New York
4. Watson, J.D., Hopkins, N.H., Roberts, J.W., Steits, J.A., *Molecular Biology of The Gene*, Volume II, 4th edition, Benjamin/Cumming, Menlo Park, 1987.
5. Watson, J.D., Gilman, M., Witkowski, J., and Zoller, M., 1998, *Recombinant DNA*, W.H. Freeman and Company, New York.



## LECTURING PROGRAMME UNIT

Course : Laboratory Management  
 Code/SKS : PAK 109/ 2 SKS  
 Allocation times : 1 X 100 Minutes  
 Session : 1

**D. Aims**

**Standard of Competencies** : The student are able to manage chemicalia base on grade of dangerous and belong to more psichomotoric skill as well as using more laboratory practice tool and preparation before analysis.

**Basic Competencies**

: The student semester are able to identify kind of dangerous that possibility in laboratory, and group of chemicalia base on dangerous grade

**B. Topics**

: Working Safety in chemistry laboratory

**C. Sub Topics**

1. Kind of dangerous
2. Accident in laboratory and its managing

**D. Lecturing activities**

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	✓ Motivate to ask: what kind of dangerous and accident in laboratory	Answer, Explain	Hand out + OHP
	✓ Know "entry level" that cause accident and its managing in chemistry laboratory	Answer, Explain	Hand out + OHP
	✓ Explain competency in basic competencies and standart of competencies in the first meeting	Make attent	Hand out + OHP
<b>Presentation</b>	✓ Explain whatever about kind of dangerous and accident in chemistry laboratory and its classification	Make attent	Hand out + OHP, papan tulis
	✓ Explain, how to manage accident in chemistry laboratory	Make attent	
<b>Conclusion</b>	✓ Open the discussion	Ask, disccus the answering	Hand out + OHP, papan tulis
	✓ Summary courses	Make attent	Hand out + OHP, papan tulis
	✓ Explain some group task that must have be done	Overcome some task	
	✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers compprehensively	Make attent	Hand out + OHP, papan tulis

**E. Evaluasi**

: Quis, Individual task, Group task, mid test, final examination  
 Model of quis and home works question in essey form.  
 Individuals task is home work.  
 Groups task is a making paper with topic that have been determined.  
 Mid test and final examinations question in multiple choice form



## LECTURING PROGRAMME UNIT

### F. Refferens

1. Imam khasani, S., 1990, Keselamatan Kerja dalam Laboratorium Kimia, Gramedia, Jakarta
2. Pecsok, 1976, Modern Methods of Chemical Analysisi, John Wiley and Sons, New York
3. Skoog, 1985, Principles of Instrumental Analysis, Sounders College Publ , New York



## LECTURING PROGRAMME UNIT

Course : Food Analysis  
 Code/SKS : PAK 339/ 2 SKS  
 Allocation times : 1 X 100 Minutes  
 Session : 1

E. Aims  
**Standard of Competencies** : The student are able to explain and analysis matter in the food matter.

**Basic Competencies** : The student are able to discribe classification and anylisis of product based milk

B. Topics : Analysis product base milk

C. Sub Topics : Product base milk, classification and analysis

D. Lecturing activities

Contents	Lecturing activities	Student act ivies	Lecturing media
<b>Introduction</b>	✓ Motivate to ask: term of product based milk and classification	Answer, Explain	Hand out + LCD
	✓ Know "entry level" by asking product based milk in the food matter	Answer, Explain	Hand out + LCD
	✓ Explain competency in basic competencies and standart of competencies in the second meeting	Make attent	Hand out + LCD
<b>Presentation</b>	✓ Explain what the meaning of product based milk and and its classification	Make attent	Hand out + LCD, whie board
	✓ Explain, how to analysis product based milk in the food matter		
<b>Conclusion</b>	✓ Open the discussion	Make attent	Hand out + LCD, white board
	✓ Summary courses	Ask, disccus the answering	
	✓ Explain some group task that must have be done	Make attent	
	✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers comphrehensively	Overcome some task	

E. Evaluation : Quis, Individual task, Group task, mid test, final examination  
 Model of quis and home works question in essey form.  
 Individuals task is home work.  
 Groups task is a making paper with topic that have been determined.  
 Mid test and final examinations question in multiple choice form



## LECTURING PROGRAMME UNIT

### F. Refferens

1. Aurand, L. W., Woods, A. E., Wells, M. R., 1987, Food Composition and Analyses, Van Nostrand Reinhold, Co, New York
2. Winarno, F. G., 1990, Kimia Pangan dan Gizi, UI Press, Jakarta
3. Sudarmadji, S., 1987, Analisis Pangan dan Pertanian, Gadjah Mada Press, Yogyakarta.





## LECTURING PROGRAMME UNIT

Course : Food Analysis  
 Code/SKS : PAK 339/ 2 SKS  
 Allocation times : 1 X 100 Minutes  
 Session : 2

**A. Aims**

**Standard of Competencies** : The student are able to explain and analysis matter in the food matter.

**Basic Competencies** : The student are able to discribe classification and analysis dye agent in the Food matter

**B. Topics** : Analysis product base milk

**C. Sub Topics** : Dye agent, classification and analysis

**D. Lecturing activities**

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	✓ Motivate to ask: term of dye agent and classification	Answer, Explain	Hand out + LCD
	✓ Know "entry level" by asking dye agent in the food matter	Answer, Explain	Hand out + LCD
	✓ Explain competency in basic competencies and standart of competencies in the second meeting	Make attent	Hand out + LCD
<b>Presentation</b>	✓ Explain what the meaning of dye agent and and its classification	Make attent	Hand out + LCD, whie board
	✓ Explain, how to analysis dye agent in the food matter		
<b>Conclusion</b>	✓ Open the discussion	Make attent	Hand out + LCD, white board
	✓ Summary courses	Ask, disccus the answering	
	✓ Explain some group task that must have be done	Make attent	
	✓ Give some confirmation about some answers and give some guidelines to trace some refferences in such away to get a more answers comprehensively	Overcome some task	

**E. Evaluation** : Quis, Individual task, Group task, mid test, final examination  
 Model of quis and home works question in essey form.  
 Individuals task is home work.  
 Groups task is a making paper with topic that have been determined.  
 Mid test and final examinations question in multiple choice form

**F. Refferens**

1. Aurand, L. W., Woods, A. E., Wells, M. R., 1987, Food Composition and Analyses, Van Nostrand Reinhold, Co, New York
2. Winarno, F. G., 1990, Kimia Pangan dan Gizi, UI Press, Jakarta
3. Sudarmadji, S., 1987, Analisis Pangan dan Pertanian, Gadjah Mada Press, Yogyakarta.



## LECTURING PROGRAMME UNIT

Course : Qualitative analysis  
 Code/SKS : PAK 231/ 3  
 Allocation times : 3 X 50 Minutes  
 Session : 1

**A. Aims**

**Standard of Competencies** : The student are able to analysis and identify of inorganic mixture sistematically.

**Basic Competencies**

: The student in third semester are able to discribe function of chemical analysis, chemical qualitative analysis and defferent of qualitative and quantitative analysis with truthness 80% minimaly

**B. Topics**

: Introduction of qualitative analysis

**C. Sub Topics**

- : 1. Define and term
2. Position of chemical analysis
3. Other example of qualitative analysis

**D. Lecturing activities**

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	<ul style="list-style-type: none"> <li>✓ Discribe range topic in the first meeting</li> <li>✓ Explain competency in basic competencies and standart of competencies in the second meeting</li> <li>✓ Discribe advantage of chemical analysis to chemical scientist</li> </ul>	Prepare to discuss, so involve in discuss actively	OHP + Transparancy
<b>Presentation</b>	<ul style="list-style-type: none"> <li>✓ Discribe coueses of qualitative analysis generally.</li> <li>✓ Discribe define and term in qualitative analysis:               <ul style="list-style-type: none"> <li>- Ask to student about define of analysis, qualitative, qualitative analysis</li> <li>- Write of student answering in white board.</li> <li>- Conclude and add about term of qualitative analysis.</li> </ul> </li> <li>✓ Discribe position chemical analysis in daily.               <ul style="list-style-type: none"> <li>- Ask about chemical analysis in daily.</li> <li>- Order to student for giving some commments.</li> <li>- Conclude with give some addition statement toward commments student</li> </ul> </li> <li>✓ Discribe fuction and position qualitative analysis daily.               <ul style="list-style-type: none"> <li>- Ask function and qualitative analysis position daily.</li> <li>- Order to student for giving comment.</li> <li>- Conclude with give some addition statement toward commments student</li> </ul> </li> </ul>	Take attent, writing, question_answer and discuss	OHP + Transparancy + white board



## LECTURING PROGRAMME UNIT

<b>Conclusion</b>	✓ Close of meeting - Give task to student to describe of chemical analysis term, qualitative analysis, function and position in the live daily. - Order to student for giving comment. - Conclude with give some addition statement toward comments - Explain some group task that must have be done	Take attent, writing, question_answer and discuss	White Board
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E. Evaluation : Quis, Individual task, Group task, mid test, final examination  
Model of quis and home works question in essey form.  
Individuals task is home work.  
Groups task is a making paper with topic that have been determined.  
Mid test and final examinations question in multiple choice form

### F. Refferens

1. Vogel, A.I, 1989, Textbook of Qualitatif Chemical Analysisi, edisi ke-5, Longman
2. Harjadi, 1989, Kimia Analitik Dasar, Gramedia



## LECTURING PROGRAMME UNIT

Course : Qualitative analysis  
 Code/SKS : PAK 231/ 3  
 Allocation times : 3 X 50 Minutes  
 Session : 6 and 7

**A. Aims**

**Standard of Competencies** : The student are able to analysis and identify of inorganic mixture sistematically.

**Basic Competencies**

: The student in third semester are able to discribe classification cation in the analytical group with truthness 80% minimally

**B. Topics**

: Reaction of cation

**C. Sub Topics**

- : 1. Classification cation in the analitical group
2. Something that must been studied if study of ion reaction
3. Classification cation by Alvarez Querol and wilson; Camog; West; Vick, and Le Rosen

**D. Lecturing activities**

Contents	Lecturing activities	Student activities	Lecturing media
<b>Introduction</b>	1. Discribe range topics in the sixth and seventh meeting 2. Explain competency in basic competencies and standart of competencies in the second meeting 3. Discribe advantage of chemical analysis to chemical scientist	Prepare to discuss, so involve in discuss actively	OHP + Transparency + white board
<b>Presentation</b>	4. Discribe classification cation base on H <sub>2</sub> S a. Menanyakan pengetahuan mahasiswa tentang klasifikasi cation with H <sub>2</sub> S methode b. Write of student answering in white board. c. Conclude and add about clasification base on H <sub>2</sub> S conventional methode 5. Discribe reaction cation with grouping frame work M base on H <sub>2</sub> S methode a. Ask identifiacaty cation specifically. b. Give example colour of precipitate and complexes. c. Order to student for giving comment d. Conclude with give some addition statement toward comments student 6. Discribe something that must been attented in ion studying a. Ask about chemical that dangerous, symbol and how to prepare of reagen b. Give example about chemical symbol that dangerous c. Order for giving comment d. Conclude with give some addition	Take attent, writing, question_answer and discuss	OHP + Transparency + white board



## LECTURING PROGRAMME UNIT

Contents	Lecturing activities	Student activities	Lecturing media
	statement toward comments. 7. Describe cation classification base on the others methods except H <sub>2</sub> S method a. Describe scheme of classification cation base on Alvarez Querol and Wilson; Carnog; West, Vick, dan Le Rosen. b. Order to student for giving comment c. Conclude with give some addition statement toward comments		
<b>Conclusion</b>	8. Close of meeting a. Give a task to student for classify of cation base on H <sub>2</sub> S methode, Alvarez Querol and Wilson; Carnog; West, Vick, dan Le Rosen b. Order to student for giving comment c. Conclude with give some addition statement toward comments and give scoring d. Give some describing of topic that will be discussed in the next courses.	Take attent, writing, question_answer and discuss	OHP + Transparancy + white board

### E. Evaluation

: Quis, Individual task, Group task, mid test, final examination  
 Model of quis and home works question in essey form.  
 Individuals task is home work.  
 Groups task is a making paper with topic that have been determined.  
 Mid test and final examinations question in multiple choice form

### F. Refferens

1. Vogel, A.I, 1989, Textbook of Qualitatif Chemical Analysisi, edisi ke-5, Longman
2. Harjadi, 1989, Kimia Analitik Dasar, Gramedia



## LECTURING PROGRAMME UNIT

Course : Chemistry separation  
Code/SKS : PAK 234/ 2 sks  
Allocation times : 2 X 50 Minutes  
Session : 1

A. Aims

**Standard of Competencies** : The student are able to define of separation methode principle both organic and inorganic.

**Basic Competencies** : The student in fourth semester are able to discribe function and principle of separation methode with truthness 80% minimally

B. Topics

: Introduction of chemistry separation

C. Sub Topics

1. Define dan term
2. Position and function of chemistry separation
3. General principle of chemistry separation

D. Lecturing activities

Contents	Lecturing activities	Student activities	Lecturing media
Introduction	<ol style="list-style-type: none"><li>1. Discribe range topics before and after first meeting</li><li>2. Explain competency in basic competencies and standart of competencies in the first meeting</li><li>3. Discribe advantage of chemical separation to chemical scientist</li></ol>	Prepare to discuss, so involve in discuss actively	OHP + Transparant