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Other Contributor(s)	University of Hong Kong. Faculty of Dentistry.
Author(s)	Chow, T. W.; Dyson, John Edwin
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Faculty of Dentistry – University of Hong Kong

The Undergraduate Programme in

Prosthetic Dentistry

1996-97

Preface

This document has been prepared as a record of the undergraduate programme in Prosthetic Dentistry for the academic year 1996-97. The main purpose of this was to facilitate discussions leading to the development of a new programme in Oral Rehabilitation to be introduced in the year 1997-98.

J.E. Dyson
July 1997

Contents

Contributors:

Chow TW
Chung WC
Dias APLH
Dyson JE ***(ed.)***
Leung KCM
Pow EHN

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Course Objectives

The course was designed to provide the student with a knowledge of the principles and practice of:

1. Assessment of occlusion and mandibular function of dentate patients.
2. Diagnosis and treatment planning for partially dentate and edentulous patients taking into account the inter-relationship between prosthetic dentistry and other disciplines.
3. The clinical and laboratory use of dental materials relevant to prosthetic dentistry.
4. Removable partial dentures prosthodontics.
5. Complete denture prosthodontics.
6. Overdenture treatment.
7. Immediate replacement denture treatment.
8. Dental technology procedures related to prosthetic dentistry.
9. The planning of minor surgical procedures related to the provision of dentures.
10. Occlusal adjustment.
11. Infection control measures in prosthetic dentistry.

and an understanding of the basic principles of:

12. Implants.
13. Prosthetic treatment of patients with congenital and post-surgical defects involving oral and maxillo-facial structures.
14. Precision attachments.
15. Sectional dentures.

By the end of the course the student was expected to be able to:

1. Assessment of occlusion and mandibular function of dentate patients.

a) Describe the occlusal and mandibular functions of "normal" dentate individuals.

b) Perform a basic clinical examination, and detect the presence of disturbances of temporo-mandibular joint function.

c) Make impressions of dentate arches with correct vestibular and posterior extension.

d) Pour and trim study casts.

e) Make jaw relationship records to enable the casts to be mounted in a semi-adjustable articulator and to allow the articulator to be correctly adjusted.

f) Mount casts in the articulator and make appropriate articulator adjustments.

g) Assess the occlusion of articulated study casts and identify and describe occlusal discrepancies.

h) Describe the design of occlusal overlay appliances, overlay dentures and their role in the management of occlusal problems and protection of the dentition.

2. Diagnosis and treatment planning for partially dentate and edentulous patients.

a) Obtain an appropriate history and carry out suitable extra-oral and intra-oral examination of partially dentate and edentulous patients with regard to their prosthetic and other dental needs.

b) Plan and carry out (or when appropriate, refer for) further necessary diagnostic investigations.

c) State diagnoses of conditions relevant to the management of patients requiring dentures.

d) Recognize and understand the significance of anatomical features, pathological , functional and psychological conditions (including those associated with aging) which may affect the execution or outcome of prosthetic treatment.

e) Determine a suitable treatment plan, setting out the prosthetic and other items of treatment required in an appropriate order.

f) Recognize those prosthetic or other problems which are beyond the scope of their ability to treat and to arrange appropriate specialist referral.

3. The clinical and laboratory use of dental materials relevant to prosthetic dentistry.

a) State the principal constituents, clinical applications and behaviour of the types of materials commonly used in prosthetic dentistry.

b) Explain the reasons for selection of particular types of material for particular applications in prosthetic treatment.

c) Correctly handle the materials commonly used in prosthetic dentistry and explain the underlying reasons for manufacturers' instructions.

d) Recognize and account for errors, faults and discrepancies due to behavioral and structural aspects of materials used.

4. Removable partial dentures prosthodontics.

a) Survey study casts and prepare appropriate cast cobalt chromium framework and acrylic denture designs (including provisional and transitional denture designs) for partially dentate patients.

b) Plan and execute tooth preparation procedures necessary to accomplish the proposed denture design.

c) Design restorations for abutment teeth which provide for optimal placement of partial denture components.

d) Demonstrate an ability to provide appropriate motivational and post-insertion instructions to patients.

e) Carry out all the clinical procedures associated with the construction of cast cobalt chromium framework and acrylic dentures.

f) Carry out the clinical procedures associated with repairs, relining and modification (by artificial tooth addition [including immediate additions], clasp repair and addition *etc.*) of partial dentures.

g) Recognise problems associated with design, aesthetic and functional aspects of existing partial dentures.

5. Complete denture prosthodontics.

a) Make assessment of design, functional and aesthetic aspects of patients' existing complete dentures.

b) Make an assessment of the expected prosthetic difficulties of complete denture provision, based on the history and examination of the edentulous patient.

c) Identify the need for, and carry out modification of existing dentures (*e.g.* use of tissue conditioners, occlusal correction *etc.*) prior to construction of new dentures.

d) Carry out all the necessary clinical and chairside procedures associated with the construction of complete dentures (including provision of appropriate patient instructions).

e) Identify the need for, and carry out the clinical procedures of relining or rebasing complete dentures.

f) Carry out the clinical procedures associated with the repair, border modification and occlusal correction of complete dentures.

g) Identify pathological conditions associated with the wearing of complete dentures and to plan (and, if appropriate, carry out) suitable corrective action.

h) Describe the rationale for, and techniques associated with, the use of replicas of existing dentures in the construction of new complete dentures.

6. Overdenture treatment.

a) Identify patients who would be appropriately treated by complete overdentures and provide appropriate counselling.

b) Select suitable teeth for use as overdenture abutments.

c) Carry out the preparation of teeth as domed overdenture abutments.

d) Describe the advantages, disadvantages and use of precision attachments and magnets in overdenture treatment.

e) Carry out the clinical procedures associated with the construction of complete overdentures on domed abutments.

7. Immediate replacement denture treatment.

a) Identify patients who would be appropriately treated by provision of partial or complete immediate replacement dentures.

b) Carry out the clinical procedures (including cast trimming) associated with the construction, insertion and maintenance of partial and complete immediate replacement dentures (where few natural teeth are immediately replaced and alveolotomy is not required).

c) Demonstrate an ability to provide patients with appropriate pre-treatment and post-insertion counselling.

d) Describe the indications for, contraindications to, and procedures of alveolotomy and alveolectomy in the context of immediate replacement denture treatment.

8. Dental technology procedures related to prosthetic dentistry.

a) Describe the laboratory procedures related to the construction and maintenance of partial and complete dentures (including overdentures and immediate replacement dentures).

b) Write clear laboratory instructions.

c) Carry out chairside procedures appropriate to general clinical practice including:

Pouring casts
Mounting/remounting casts in a semi-adjustable articulator
Making adjustments to the positions of teeth in wax dentures
Carrying out chairside occlusal and other necessary adjustments of dentures

9. The planning of minor surgical procedures relating to the provision of dentures.

a) Recognize anatomical and pathological conditions which require surgical treatment prior to denture construction.
b) Describe, in general terms, the minor surgical procedures which may be necessary prior to denture construction.
c) Counsel the patient on matters relating to pre-prosthetic surgery.
e) Prepare appropriate records (study casts, surgical template or wax up of artificial teeth *etc.*) and write referral notes which will effectively communicate the intended treatment to the oral surgeon.

10. Occlusal adjustment.

a) Describe the rationale of occlusal equilibration.
b) Prepare appropriate records for diagnosis and treatment planning in achieving a `functional' occlusion.
c) Carry out occlusal adjustments to facilitate the provision of partial or complete dentures.

11. Infection control measures in prosthetic dentistry.

a) Demonstrate an awareness of infection control problems in prosthetic dentistry and a competence in standard infection control procedures.

12. Implants.

a) Describe the principles of osseointegration in relation to dental implants.
b) Describe, in general terms, the restorative aspects and role of osseointegrated dental implants in removable prosthodontics.

13. Prosthetic treatment of patients with congenital and post-surgical defects involving oral and maxillo-facial structures.

a) Demonstrate a basic knowledge of the role of the prosthodontist in the treatment of patients with congenital and post-surgical defects involving oral and maxillo-facial structures.

14. Precision attachments.

a) Give a general description and classification of the various types of precision attachments.

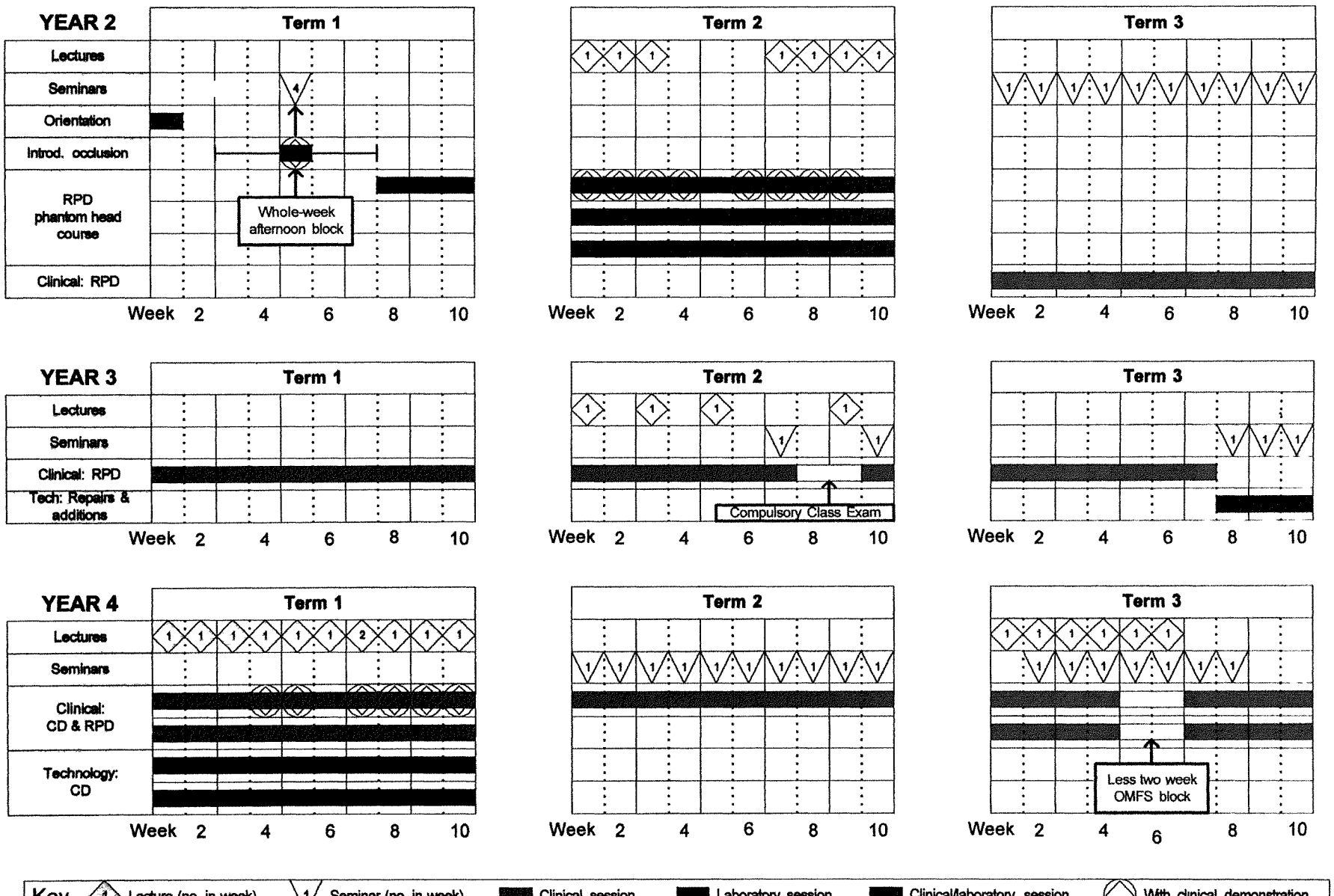
b) Demonstrate an understanding of the principal advantages/indications and disadvantages/contraindications of precision attachments.

15. Sectional dentures.

a) Describe the general principles of sectional dentures.

Undergraduate Programme in Prosthetic Dentistry (Years 2-4) 1996-97

Timeline Chart



Sessional Timetables

Year 2 Term 1

Week 1 : Orientation and Introduction to Prosthetic Dentistry

Week 2-7		**Clinical**		**Technology**
One Week Block	Seminar	Demonstration	Practical	Demonstration/ Practical
Monday	U/L Impressions	U/L Impressions		Pour/Trim Casts
Tuesday	Occlusion, Mandibular Movements & Positions		U/L Impressions	
Wednesday	Articulators			
Thursday	Facebow Record & Jaw Relations	Facebow Record & Jaw Relations	Facebow Record & Jaw Relations	Mount Casts
Friday				

Partial Denture Phantom Head Course

Week	**Practical (Clinic)**	**Practical (Laboratory)**
8	U/L Impressions/ Facebow Record/ Jaw Relations	Pour/Trim/Mount Casts
9		
10		
Guided Learning		Anterior Tooth Index

Year 2 Term 2

Partial Denture Phantom Head Course *(cont.)*

			Clinical		**Technology**
Week	Session	Lecture	Demonstration	Practical	Demonstration/ Practical
1	1	Introduction to the Principles of Removable Partial Denture Design	Impressions for study casts/ Facebow Record/ Jaw Relations	Anterior Try-in	
	2			Anterior Try-in	Custom Trays
	3				
2	1	Components of Removable Partial Dentures & Preliminary Design	Survey/Design	Survey/Design	Survey/Design
	2			Survey/Design	
	3			Tooth Preps./ Working Imps.	
3	1	Anterior Saddle Partial Denture	Tooth Preps. & Working Imps.		
	2				
	3				
4	1		Resurvey Master Cast	Resurvey Master Cast	Pour Casts
	2			Resurvey	Block Out
	3				
5	1				Duplication
	2				Wax Pattern
	3				

Year 2 Term 2 *(cont.)*

			Clinical		Technology
Week	Session	Lecture	Demonstration	Practical	Demonstration/ Practical
6	1		Try-in Framework		Wax Pattern
	2				Spruing/Investing
	3				
7	1	Free-end Saddle Partial Dentures	Wax Try-in		Casting/Adjust/ Polish Co-Cr Framework
	2			Try-in Framework	
	3				
8	1		Delivery	Try-in Framework	Set Teeth/Wax up
	2			Wax Try-in	
	3	Survey/Final Design/Tooth Preparation			Flasking/Processing
9	1		Review		
	2				Deflask/Remount
	3	Clinical & Laboratory Procedures			
10	1			Fit Denture to Phantom Head	Polishing/Finishing
	2				
	3	Casting Failures			

Year 2 Term 3

Clinical - Partial Dentures

Week	Seminar	Clinic
1	Components of Partial Dentures	Patient Treatment
2	Surveying and Design	
3	Problems of Free-end Saddles	
4	Partial Denture with Anterior Saddle	
5	Mandibular Movements, Jaw Relations and Occlusion	
6	Anatomy of Maxilla and Mandible in relation to Impression	
7	Selection of Impression Materials	
8	Partial Denture Aesthetics	
9	Oral Hygiene and Sequelae of Partial Denture Wearing	
10	Transitional and Overlay Partial Dentures	

Year 3 Term 1

Week	Clinical
1	Patient Treatment : Continued from Term 2.3
2	
3	
4	
5	
6	
7	
8	
9	
10	

Year 3 Term 2

Week	Lecture	Seminar	Clinical
1	RPD Failure	-	Continue Patient Treatment
2	-	-	
3	Transitional Partial Dentures	-	
4	-	-	
5	Precision Attachments & Sectional Dentures	-	
6	-	-	
7	-	Further Aspects of R.P.D. Design (Conservative)	
8	-	**Compulsory class examination:** impressions, viva, RPD survey and design	
9	Partial Denture Revision		
10	-	Further aspects of R.P.D. Design (Periodontal and Orthodontic Considerations)	

Year 3 Term 3

Week	Clinical	Technology
1	Patient Treatment	-
2		-
3		-
4		-
5		-
6		-
7		-
8	Seminar	Addition of teeth and flange to upper RPD
9	Seminar	Repair of fractured clasp of RPD
10	Seminar	Repair of fractured CL denture

Year 4 Term 1

			Clinical		Technology	
Week	**Sess.**	**Lecture**	**Demonst.**	**Practical**	**Demonstration**	**Practical**
1	Clin.	Assessment of the Complete Denture Patient		Patient Treatment		
	Clin.					
	Tech.				Pour Casts	Pour Casts
	Tech.				Custom Tray	Custom Tray
2	Clin.	Stages in Complete Denture Construction		Patient Treatment		
	Clin.					
	Tech.				Box & Pour	Box & Pour
	Tech.				Make Base Construction	Base Construction
3	Clin.	The Complete Denture Base		Patient Treatment		
	Clin.					
	Tech.				Deflask+Polish	Flasking
	Tech.				Occlusal Rims	Deflask+Polish
4	Clin.	Jaw Relationships for Complete Dentures	Preliminary Impression			
	Clin.			Preliminary Impression		
	Tech.				Articulate Casts	Occlusal Rims
	Tech.				Set Up Teeth	Articulate Cast
5	Clin.	Complete Denture Aesthetics		Preliminary Impression		
	Clin.		Working Impressions	Working Imp. (On Cast)		
	Tech.					Set Up Teeth
	Tech.					Set Up Teeth

Year 4 Term 1 *(cont.)*

			Clinical		Technology	
Week	**Sess.**	**Lecture**	**Demonst.**	**Practical**	**Demonst.**	**Practical**
6	Clin.	Complete Denture Occlusion		Working Imps.		
	Clin.			Working Imps. Try-in		
	Tech.					Adjust Lat. & Prot. Occlusion
	Tech.				Balanced Occlusion	Adjust Lat. & Prot. Occlusion
7	Clin.	Complete Dentures Using Duplication Technique	Jaw Relations	Jaw Relations		
	Clin.			Jaw Relations		
	Tech.	Maintenance of Prostheses - Repairs, Relining and Rebasing			Finish Wax Up	Wax Up
	Tech.					
8	Clin.	Immediate Replacement Dentures	Flat Try-in + Protrusive Record	Flat Plane Try-in		
	Clin.			Protrusive Record		
	Tech.				Process	Remount & Finish
	Tech.					
9	Clin.	Prosthodontic Treatment of the Institutionalized & Housebound Elderly	Second Try-in	First Try-in Protrusive Rec.		
	Clin.			Second Try-in		
	Tech.				Remount & Adjust	
	Tech.					

Year 4 Term 1 *(cont.)*

			Clinical		Technology	
Week	**Sess.**	**Lecture**	**Demonstr.**	**Practical**	**Demonstr.**	**Practical**
10	Clin.	Complete Dentures Opposed by Natural Standing Teeth	Check Record & Delivery	Second Try-in		
	Clin.			Check Record & Fit		
	Tech.				Remount & Adjust	
	Tech.					

Year 4 Term 2

Week	**Seminar**	**Clinical Practice**
1	Retention/Support 1	Patient Treatment & Assessment Clinic as timetabled separately
2	Retention/Support 2	
3	Jaw Relations 1	
4	Jaw Relations 2	
5	Anterior Tooth Selection	
6	Posterior Tooth Selection	
7	Complete Denture Occlusion	
8	Denture Maintenance	
9	Denture Problems 1	
10	Denture Problems 2	

Year 4 Term 3

Week	Lecture	Seminar	Clinical Practice
1	Introduction to Implants	Continued Patient Treatment & Assessment Clinic	
2	Treatment Planning for Implants	Duplication of Complete Dentures and Rebasing	
3	Single Tooth Implants	Overdentures	
4	Implants for Partially Dentate Patients	Implants	
5	Implants for Edentulous Patients	Precision Attachment	
6	Prosthetic Treatment of Cleft Palates and Post Surgical Defects	R.P.D. Design and Treatment Planning 1	
7		R.P.D. Design and Treatment Planning 2	
8		R.P.D. Design and Treatment Planning 3	
9		[O.M.F.S. Block]	
10		[O.M.F.S. Block]	

Contents of seminars

Year 2 Term 1 (year, term, day - whole week afternoon block)

2.1.1 Upper and Lower Impressions
2.1.2 Occlusion, Mandibular Movements & Positions
2.1.3 Articulators
2.1.4 Facebow Record and Jaw Relations

Year 2 Term 3 (year, term, week)

2.3.1 Components of Partial Dentures
2.3.2 Survey and Design
2.3.3 Problems of the Free-end Saddle
2.3.4 Partial Dentures with Anterior Saddle
2.3.5 Mandibular Movements, Jaw Relations and Occlusion
2.3.6 Anatomy in relation to Impressions
2.3.7 Selection of Impression Materials
2.3.8 Partial Denture Aesthetics
2.3.9 Oral Hygiene and Sequelae of Partial Denture Wearing
2.3.10 Interim, Transitional and Overlay Partial Dentures

Year 3 Term 2 (year, term, week)

3.2.7 Further Aspects of R.P.D. Design - Conservative Considerations
3.2.10 Further Aspects of R.P.D. Design - Periodontal and Orthodontic Considerations

Year 3 Term 3 (year, term, week)

3.3.8 Additions to RPDs
3.3.9 RPD repairs -1
3.3.10 RPD repairs -2

Year 4 Term 2 (year, term, week)

4.2.1 Retention and Support -1
4.2.2 Retention and Support -2
4.2.3 Jaw Relations and Records -1, Vertical Dimension
4.2.4 Jaw Relations and Records -2, Anteroposterior Jaw Relations
4.2.5 Anterior Tooth Selection and Positioning
4.2.6 Posterior Tooth Selection and Positioning
4.2.7 Complete Denture Occlusion
4.2.8 Denture Insertion and Maintenance
4.2.9 Diagnosis of the Complete Denture Patient
4.2.10 Preparatiion of the Mouth for Complete Dentures

Year 4 Term 3 (year, term, week)

4.3.1 Duplication of Complete Dentures, Relining and Rebasing
4.3.2 Overdentures
4.3.3 Implants
4.3.4 Precision Attachments
4.3.5 R.P.D. Design and Treatment Planning Workshop -1
4.3.6 R.P.D. Design and Treatment Planning Workshop -2
4.3.7 R.P.D. Design and Treatment Planning Workshop -3

Contents of seminars - Year 2

Seminar: Year 2 Term 1 (afternoon block - Day 1)
Title: Upper and Lower Impressions

Selection of impression trays
- stock trays/custom trays/disposable trays
- selection of the correct size of impression tray

Materials for making an impression
- alginate (Blueprint™/Jeltrate™ fast-set)
- alginate adhesive
- impression compound
- beading wax (not recommended where the vestibular tissues need to be recorded acurately)

Clinical procedures in making an impression
- patient position
- patient preparation
- tray modification
- impression taking
- impression removal
- impression disinfection
- impression handling

Requirements of impressions for study casts
- what should maxillary/mandibular impression record?

Seminar: Year 2 Term 1 (afternoon block - Day 2)
Title: Occlusion, Mandibular Movements and Positions

Occlusion in partial dentures
- overjet/overbite
- freeway space
- working side contacts
- non-working/balancing side contacts
- interferences

To identify occlusal interferences
- articulating paper (red/blue), use of shimstock, occlusal indicating wax

Mandibular movements and positions
- TMJ
- hinge/rotational
- sliding/translatory
- ICP
- RCP
- protrusion
- lateral excursion

Seminar: Year 2 Term 1 (afternoon block - Day 3)
Title: Articulators

Function of articulators

Classification of articulators
- hinge
- fixed value (average value)
- semi-adjustable
- fully-adjustable
- fossa-moulded

Semi-adjustable articulators
- arcon/non-arcon
- setting of Dentatus articulator

Seminar: Year 2 Term 1 (afternoon block - Day 4)
Title: Facebow Record and Jaw Relations

Use of facebow

Components of a facebow
- 'U' shaped bow
- condylar rods
- bite fork
- anterior reference point indicator (orbital pointer)

Procedures in facebow registration
- locate the hinge axis
- maxillary teeth imprint
- facebow attachment
- orbital pointer

Standard method of jaw registration
- ICP
- RCP
- wax rim
- bite registration paste *vs.* wax

Seminar: Year 2 Term 3 Week 1
Title: Components of removable partial dentures

General principles of design
- support – retention - stability (bracing)

Saddles
- bounded/free-end (distal extension)
- flanged/flangeless ("gum-fitted")

Connectors
- major/minor (define and demonstrate)
- need for rigidity
- bars/plates

Classification of major connectors
- upper (advantages/disadvantages, patient preference)
  - anterior palatal, mid-palatal, posterior palatal
- lower (advantages/disadvantages, patient preference)
  - lingual bar, lingual plate, sublingual bar, dental bar ("Kennedy bar" when used in combination with lingual bar), buccal bar

Rests
- principles of design
- types - occlusal (marginal ridge) rests, cingulum rests, incisal rests

Retainers
- direct and indirect retention
- terminology - "clasp", "clasp arm", "clasp assembly"
- general principles of clasp assembly design - retention, reciprocation, bracing, encirclement, support, passivity
- gingivally approaching (bar arm) clasps *vs.* occlusally approaching (circumferential) clasps -
- indications/contraindications

Bracing components
- reciprocal arms, plate connectors, mesial/distal grips

Seminar: Year 2 Term 3 Week 2
Title: Survey and Design

Preliminary ("ideal") design
- path of insertion/removal
- procedure

Survey the study casts
- the surveyor
- instruments
  - analysing rod
  - undercut gauges (0.25 mm, 0.5 mm, 0.75 mm)
  - graphite marker
  - wax knife
- procedure of surveying
- dead space
- guide planes
- retentive undercuts

Finalize the design

Plan tooth preparation
- improvements to occlusal plane
- rest seat preparation
- alter survey lines
- create undercuts
- guide planes
- embrasure widening

Design should be
- simple
- limited to one path of insertion/removal (except Kennedy Class IV)
- hygienic
- aesthetic

Seminar: Problems of the Free-end Saddle
Title: Year 2 Term 3 Week 3

Problems of the free-end saddle *vs.* bounded saddle

Problems of the free-end saddle
- support (rotation towards the ridge)
  - prevented by :
    - wide extension of base
    - maximize support by using altered-cast technique (muco-displacing impression)
    - use teeth with small bucco-lingual width and small occlusal area
    - RPA/RPI
    - principles of action
    - difference to conventional clasp-rest-reciprocal system
    - advantages/limitations/contraindications
- retention (rotation away from the ridge)
  - prevented by :
    - indirect retention
- lateral/distal movement

Seminar: Year 2 Term 3 Week 4
Title: Partial Denture with Anterior Saddle

Problems of Kennedy class IV
- aesthetics
  - flanged/flangeless saddles
  - avoid clasping anterior abutment teeth
- tendency to rotate in function
  - upwards & forwards when biting with anterior teeth
  - downwards & backwards when chewing sticky food
- difficulty in selecting the path of insertion
  - labial undercut
  - dead space

Rotational path of insertion
- principle
- surveying procedure

Indirect retention

Kennedy classes I, II & III situations with anterior modifications

Selection of abutment teeth for support

Seminar: Year 2 Term 3 Week 5
Title: Mandibular Movements, Jaw Relations and Occlusion

Mandibular movement
- hinge (rotatory)/translatory (sliding)
- border movement
  - sagittal plane
    - Posselt's envelope
  - horizontal plane
    - gothic arch
    - Bennett shift
    - Bennett angle
  - frontal plane
    - Christensen phenomenon

Jaw relations
- ICP/RCP
  - define
  - when to use
- vertical dimension
- methods of registering jaw relationships

Articulators
- types of articulators - functions and limitations
  - hinge
  - fixed value (average value)
  - semi-adjustable
  - fully-adjustable
  - fossa-moulded
- facebows

Occlusion
- types of occlusion
  - bilateral balanced occlusion
  - group function (Unilateral balanced occlusion)
  - canine guided (Mutually protected occlusion)
- requirements for an optimal occlusion
- adjustments to natural teeth
  - MUDL/BULL
- positioning the artificial teeth

Seminar: Year 2 Term 3 Week 6
Title: Anatomy of the Maxilla and Mandible in Relation to Impression

Maxilla
- surface structures
- residual ridge
- buccal sulcus
- labial and buccal fraena
- incisive papilla
- hamular notch
- maxillary tuberosity
- vibrating line
- fovea palatini
- torus palatinus

Mandible
- residual ridge
- buccal sulcus
- retromolar pad
- external oblique ridge
- mental foramen
- mentalis eminences
- lingual sulcus
- sublingual folds
- genial tubercles
- torus mandibularis

Musculature
- mylohyoid muscle
- buccinator

orbicularis oris
levators and depressor anguli oris
superior and inferior incisivi labii
levator labii superioris and depressor labii inferioris
mentalis
intrinsic and extrinsic muscles of the tongue
superior constrictor of the pharynx

Seminar: Year 2 Term 3 Week 7
Title: Selection of Impression Materials

Types of impression materials
- thermoplastic impression material
  - impression wax
  - impression compound
- rigid impression material
  - impression plaster
  - impression paste
- elastic impression material
  - hydrocolloids
    - agar (reversible)
    - alginate (irreversible)
  - synthetic elastomers
    - polysulphide rubber
    - polyether
    - silicone rubber

Requirements of impression materials

Considerations of selection of individual impression material
- properties
- advantages
- limitations
- uses

Factors influencing tissue displacement
- displaceability of tissues
- confinement of impression material in tray (spacing, perforations, extension)
- viscosity (setting, time related)
- rate of insertion

Seminar: **Year 2 Term 3 Week 8**
Title: **Partial Denture Aesthetics**

Framework
- major connector
- clasp
  - minimizing the effect on appearance by:
    - concealment
    - camouflage
    - omission
    - substitution
- rest
  - occlusal
  - cingulum
  - incisal

undercut
mesio-buccal *vs.* distal-buccal

Base material
flange
characterization
shade
flangeless
papillae

Artificial teeth
size
shade
mould
material
position
characterization

Alternative denture designs (brief introduction)
precision attachments
sectional dentures
rotational path of insertion

Seminar: Year 2 Term 3 Week 9
Title: Oral hygiene and Sequelae of Partial Denture Wearing

Denture maintenance

Denture stomatitis
fungal agent
aetiology
management procedures
antifungal therapy
correction of ill-fitting dentures
efficient plaque control

Denture cleansing methods
brushing
immersion
hypochlorite, alkaline peroxide, chlorhexidine
(action, usage, advantages and disadvantages)

Effects of partial dentures on caries and periodontal disease
rate of caries and periodontal disease of abutment teeth
studies
mechanism
acrylic resin *vs.* cobalt chromium alloy
prevention

Changes to the denture supporting alveolar process
bone resorption
prevention

Seminar: Year 2 Term 3 Week 10
Title: Interim, Transitional and Overlay Dentures

Interim dentures
- "spoon" denture, Every denture

Transitional dentures
- definition
- indications
- principles of design
  - prevention
  - support
  - retention
- stages in construction
- examples of commonly used transitional dentures

Overlay dentures
- definition
- indications
- clinical procedures
- temporary *vs.* permanent overlay dentures

Contents of seminars - Year 3

Seminar: Year 3 Term 2 Week 7
Title: Further Aspects of RPD Design - Conservative Considerations

Need for treatment planning
- critically assess prognosis of carious/fractured/non-vital teeth
- design RPD before commencing Cons treatment.
  - incorporate undercuts, rest seats etc. in restoration

Seminar: Year 3 Term 2 Week 10
Title: Further Aspects of RPD Design - Periodontal and Orthodontic Considerations

Periodontal
- plaque - increase in quantity and pathogenicity
  - Pretreatment assessment of plaque control
  - Design of RPD to facilitate plaque control
  - Consider physical ability of patient to effect plaque control

Orthodontic
- teeth could be moved before RPD treatment to improve
  - occlusion
  - aesthetics, and to
  - facilitate RPD design

Seminar: Year 3 Term 3 Week 8
Title: Additions to RPDs

Indications for addition of teeth or flange to
- existing RPD to replace teeth lost due to extractions/trauma
- existing transitional RPD to convert to CD
- existing RPD following minor surgery on alveolar ridges/soft tissues
- existing RPD following accidental fracture

Assessment of RPD for suitability for addition of teeth/flange

Seminar: Year 3 Term 3 Week 9
Title: RPD Repairs - 1

Causes of clasp fracture
- accidental
- faulty design
- attempts at adjusting clasp by bending or trimming

Repairs
- welding to framework?
- addition of wrought wire clasps
- stainless steel
- gold

Seminar: Year 3 Term 3 Week 10
Title: RPD Repairs - 2

Causes of base fracture
- accidental
- thickness insufficient
- deep notches for frena and muscle attachments etc.

Assessment of base for suitability for repair

Preparation of base for repair

Repair process

Contents of seminars - Year 4

Seminar: Year 4 Term 2 Week 1
Title: Retention and Support (1)

Retention, support and stability
- definition/importance/complaint of "looseness"
- factors:
  - border seal, close mucosal contact
  - (neuromuscular control, surface tension, gravity, atmospheric pressure)

Support
- ideal support
  - keratinized mucosa, resilient submucosa, firmly bound down to underlying cortical bone, area of muscle attachment

- topography of maxilla (areas contributing to support, 1°, 2°, R, N/C)

- topography of mandible (areas contributing to support, 1°, 2°, R, N/C)

Seminar: Year 4 Term 2 Week 2
Title: Retention and Support (2) - Impressions

Importance of good impression in relation to retention/support

Factors affecting the displacement of the mucosa
- mucosa, viscosity of material, tray design, timing

Types (advantages and disadvantages)
- "mucostatic"/mucodisplacing/selective pressure

Technique used in this hospital (rationale of each step)
- preliminary impression (compound moulding, trimming of border, alginate wash)
- outline of custom tray
- secondary impression (check and modify custom tray, ZnO/E *vs.* plaster)

Problems during impression taking and the management
- gagging
- flabby ridge, undercut

Seminar: Year 4 Term 2 Week 3
Title: Jaw Relations and Records (1) - Vertical Dimension

Factors to be established
- occlusal plane, vertical dimension, anteroposterior jaw relations

Importance of correct occlusal plane, consequences of errors
- tilted laterally/anteroposteriorly
- too high/low

Importance of correct vertical dimension, consequences of errors
- too large/small

Importance of correct anteroposterior jaw relations, consequences of errors
types of error possible

Check base and wax rim before taking jaw relations
base: roughness, extension, fit, stability, rigidity, potential "heel clash"
wax rim: simulate tooth position, soft tissue support, concept of "neutral zone"

Guides to establish occlusal plane (technique, advantages and disadvantages)
level
aesthetics, angle of mouth, yawn, retromolar pad to corners of mouth, parotid papilla
lateral orientation
interpupillary line
anteroposterior orientation
Camper's line, tongue, ridges, retromolar pad-angle of mouth

Guides to establish vertical dimension (technique, advantages and disadvantages)
aesthetics
measurement
phonetics
swallowing
bite force
comfort zone
ridges
old denture
pre-extraction record

Seminar: Year 4 Term 2 Week 4
Title: Jaw Relations and Records (2) - Anteroposterior Jaw Relations

Importance of establishing centric occlusion at centric relation
prosthetic convenience, reproducibilty by dentist and patient

Factors influencing the centric jaw relationship records

Techniques (advantages and disadvantages)
manipulation
gothic arch tracing
swallowing
cephalometric

Materials
wax
ZnO/E
plaster

Seminar: Year 4 Term 2 Week 5
Title: Anterior Tooth Positioning and Selection

Importance of anterior tooth positioning and selection

Anterior tooth positioning (advantages and disadvantages of the various techniques)
aesthetics
lip, vermilion border, nasolabial angle, aesthetic plane
biometric guide ("set the teeth where they grew")

maxillary: incisal edges 8-10mm in front of the incisive papilla, rugae, inclination of ridge crest, tips of canines on a straight line drawn through centre of incisive papilla
mandibular: angle of mouth, modiolus

functional
phonetics, smiling line, neutral zone

old record
old dentures, pre-extraction record, photograph, radiographs

Anterior tooth selection

size
interalar width, angle of mouth, face proportion, old dentures, pre-extraction record

shade
single *vs.* variety of shades
age, personality, patient, relatives
? hair, eye, skin colour
characterization

mould
inverted face
face proportion
arch shape
sex, personality, age

Seminar: Year 4 Term 2 Week 6
Title: Posterior Tooth Selection and Positioning

Importance of posterior tooth positioning and selection

Posterior tooth positioning (advantages and disadvantages)

biometric guide ("set the teeth where they grew")
maxillary: palatal gingival remnants, cheek
mandibular: ridge crest

functional
phonetics, neutral zone

old record
old dentures, pre-extraction record

Posterior tooth selection

size
ski slope, no of teeth

shade

mould (advantages and disadvantages)
30° *vs.* 20° *vs.* 0°

material (advantages and disadvantages)
acrylic *vs.* porcelain

Seminar: Year 4 Term 2 Week 7
Title: Complete Denture Occlusion

Importance of complete denture occlusion

Hanau's Quint (interrelationship)
condylar guidance, incisal guidance, cuspal angle, compensating curve, orientation

Occlusal scheme (advantages and disadvantages)

balanced occlusion, concept of "enter bolus exit balance" , non-working side (balancing side) contacts becoming non-working side interferences in function group function ("unilaterally balanced occlusion")

Seminar: Year 4 Term 2 Week 8
Title: Denture Insertion and Maintenance

Final check
- fit, extension, retention, stability, tooth positions, aesthetics, speech, vertical dimension,
- jaw relationship

Check record (rationale, technique, material)

Occlusal adjustment
- centric occlusion (MUDL rule)
- lateral excursion (BULL rule)
- protrusion

Instructions to patient
- problems may be encountered (loose, pain, speech, mastication)
- denture care (advantages and disadvantages)
  - removal at night time
  - mechanical (brushing)
  - chemical (peroxide, acid, enzyme, hypochlorite, chlorhexidine gluconate solution)
- importance of review appointments

Seminar: Year 4 Term 2 Week 9
Title: Diagnosis of the Complete Denture Patient

Diagnosis
- history (severity, timing, exclude other causes)
- examination (patient, denture)
- investigation

General causes
- patient factor
  - psychological/biological
- denture factor
  - tissue/polished/occlusal surface

Problems and management
- pain of tissue
- pain of muscle/TMJ
- looseness
- mastication
- appearance
- speech
- others (tolerance, retching)

Adjustment *vs.* new dentures
- extension (adjustment/addition)
- fit (adjustment/reline)
- retention (postdam)
- teeth setting (reset)

jaw relationship (check record - reset)

Seminar: Year 4 Term 2 Week 10
Title: Preparation of the Mouth for Complete Denture

Importance of physical and psychological preparation of patient

Psychological
- explanation of limitations

Biological
- soft tissue
  - redness, swelling, ulcer, hyperplasia, denture stomatitis, flabby ridges
  - high fraenal attachment, vertically enlarged (fibrous enlargement of)
  - maxillary tuberosity, shallow sulcus
- hard tissue
  - uneven bone, undercut, horizontally enlarged maxillary tuberosity, sharp mylohyoid ridge, mentalis eminences, genial tubercules

Management
- non-surgical
  - removal of cause
  - tissue conditioning
- surgical
  - excision, recontouring, vestibuloplasty, ridge augmentation

Seminar: Year 4 Term 3 Week 1
Title: Duplication of Complete Dentures and Relining/Rebasing

Denture duplication
- indications and contraindications
- clinical and laboratory procedures

Relining/rebasing
- indications and contraindications
- clinical and laboratory procedures

Seminar: Year 4 Term 3 Week 2
Title: Overdentures

Advantages
- preserve bone/proprioception
- improve support/stability/(retention)/aesthetics
- easy plaque control, less mobile, psychological, convertibility

Disadvantages
- still susceptible to caries, periodontal disease, wear
- undercut, over-contour, under-contour
- interocclusal clearance (high occlusal plane, easy base fracture)
- cost of endondontic therapy

Indications and contraindications

Use of magnets, bars and stud attachments

Clinical and laboratory procedures

Seminar: Year 4 Term 3 Week 3
Title: Implants

Definition, classification, history and development

Scientific background of titanium endosseous implants

Implants *vs.* other treatment options (advantages and disadvantages)

Clinical and laboratory procedures
- assessment
- stage I
- post-stage I
- stage II
- post stage II
- prosthesis construction
- recall

Other applications and future development

Seminar: Year 4 Term 3 Week 4
Title: Precision Attachments

Definition
- prefabricated (precision) and custom made (semi-precision) attachments

Classification
- extra-coronal, intra-coronal, bars, studs, miscellaneous
- examples

Advantages
- aesthetic, retentive

Disadvantages
- extensive tooth reduction, stress on abutment
- time/cost
- need for high standard of laboratory support
- difficult repair and maintenance

Clinical and laboratory procedures

Seminar: Year 4 Term 3 Week 5-7
Title: RPD Design and Treatment Planning Workshops 1-3

Case discussion

Contents of Lectures

Year 2 Term 2 (year, term, week)

2.2.1 Introduction to Principles of Removable Partial Dentures
2.2.2 Components of Removable Partial Dentures and Preliminary Design
2.2.3 Free-end Saddle Partial Dentures
2.2.7 Anterior Saddle Partial Dentures
2.2.8 Survey/Final Design/Tooth Preparation
2.2.9 Clinical & Laboratory Procedures
2.2.10 Casting Failures

Year 3 Term 2 (year, term, week)

3.2 1 RPD Failures
3.2.3 Transitional Partial Dentures
3.2.5 Precision Attachments & Sectional Dentures
3.2.9 Partial Denture Revision

Year 4 Term 1 (year, term, week)

4.1.1 Assessment of the Complete Denture Patient
4.1.2 Stages in Complete Denture Construction
4.1.3 The Complete Denture Base
4.1.4 Jaw Relationships for Complete Dentures
4.1.5 Complete Denture Aesthetics
4.1.6 Complete Denture Occlusion
4.1.7a Complete Dentures Using Duplication Techniques
4.1.7b Maintenance of Prostheses - Repairs, Relining and Rebasing
4.1.8 Immediate Replacement Dentures
4.1.9 Prosthodontic Treatment of the Institutionalized and Housebound Elderly
4.1.10 Complete Dentures Opposed by Natural Standing Teeth

Year 4 Term 3 (year, term, week)

4.3.1-5 Implants 1-5
4.4.6 Prosthetic Treatment of Cleft Palates and Post Surgical Defects

Contents of lectures - Year 2

Lecture: Year 2 Term 2 Week 1
Title: Introduction to the Principles of Removable Partial Dentures
Lecturer: JE Dyson

Reasons for tooth loss and its effects on appearance and function

Sequelae to tooth loss
- bone resorption (rate of bone loss following extraction)
- loss of support of facial musculature
- overeruption, tilting and drifting of teeth and their effects on occlusion

Alternative methods of managing edentulous spaces
- "masterly inactivity"
- fixed prosthesis (principal advantages/disadvantages)
- removable prosthesis (..)
- implant retained prosthesis (..)

Objectives of RPD treatment

Specific indications for RPDs
- long edentulous span
- lost alveolar bone needs to be replaced
- patient preference, time/cost constraints
- where extensive tooth preparation/surgery are contraindicated

Potential harmful effects of RPDs
- caries
- periodontal disease
- alveolar bone loss
- (mucosa)

Minimizing potential harmful effects of RPDs
- replace only those teeth which need to be replaced
- minimal coverage of teeth and gingivae
- design to provide good *SUPPORT* and *STABILITY* (define)

General principles of design (mechanical)
- support
- retention
- stability (bracing)

Classification of saddles
- bounded / free-end (distal extension)
- flanged / flangeless ("gum-fitted")

Classification of RPDs
- by support
  - tooth (why preferred)
  - mucosa
  - tooth and mucosa (principal problems of free end saddles)
- Kennedy Classification
  - principles of the system
    - ignore teeth not being replaced
    - most posterior saddle determines the classification

class IV must cross the midline (no modifications)

examples of classes I, II, III and IV (with modifications)

Lecture: Year 2 Term 2 Week 2
Title: Components of Removable Partial Dentures and Preliminary Design
Lecturer: JE Dyson

General principles of design - provision of:
- support
- retention
- stability (bracing)

Saddles
- bounded/free-end (distal extension)
- flanged/flangeless ("gum-fitted")

Connectors
- major/minor (define and demonstrate)
- need for rigidity
- bars/plates

Classification of major connectors
- upper (advantages/disadvantages, patient preference)
  - anterior palatal, mid-palatal, posterior palatal
- lower (advantages/disadvantages, patient preference)
  - lingual bar, lingual plate, sublingual bar, dental bar ("Kennedy bar" when used in combination with lingual bar), buccal bar

Rests
- principles of design
- types - occlusal (marginal ridge) rests, cingulum rests, incisal rests

Retainers
- direct and indirect retention
- terminology - "clasp", "clasp arm", "clasp assembly"
- general principles of clasp assembly design - retention, reciprocation, bracing, encirclement, support, passivity
- gingivally approaching (bar arm) clasps *vs.* occlusally approaching (circumferential) clasps -
- indications/contraindications

Bracing components
- reciprocal arms, plate connectors, mesial/distal grips

Preliminary ("ideal") design
- path of insertion/removal
- procedure:
  - outline saddles
  - connect saddles
  - provide resistance to movement towards the tissues (support)
  - provide resistance to movement away from the tissues (retention)
  - provide resistance to antero-posterior and lateral movement (bracing)
  - provide resistance to rotations
  - simpify the design

Lecture: Year 2 Term 2 Week 3
Title: Free-end Saddle Partial Dentures
Lecturer: TW Chow

Kennedy classification
- class I
- class II

Difficulties
- support
- retention
- stability

Two rotations considered
1) towards ridge
   - problems to : teeth/bone
   - design features : maximum coverage, Applegate technique, narrow occlusal table, RPI/RPA
2) away from ridge
   - problems to : teeth/retention
   - design features : indirect retention, RPI/RPA

Distal movement
- MD grips - pros and cons

RPI system
- I-bar/Akers clasps
  - contra-indications/indications

Lecture: Year 2 Term 2 Week 7
Title: Anterior Saddle Partial Dentures
Lecturer: TW Chow

Options to replace anterior teeth:
- implant
- bridge
- RPD

Kennedy classification - class IV
- definition
- limitations and peculiarity of definition

Difficulties
- retention, stability (rotation)
  - design features
    - guideplane
    - posterior tilt - labial undercut for flange
    - indirect retention (re: class I/free-end saddles cases)
    - rotational path of insertion
- aesthetics - dead spaces
  - design features

flangeless denture
no direct retainers next to saddle
rotational path of insertion

Rotational path of insertion
principles
2 tilts : 0° tilt
posterior tilt
versatility of rest/clasp/reciprocal complex
difficulties when
flange required
additional saddle

Lecture: Year 2 Term 2 Week 8
Title: Survey, Final Design, Tooth Preparation
Lecturer: APLH Dias

Designing RPD
preliminary design - (very brief revision)
survey
final design

Survey
cast surveyor and its accessories
determining tilt of occlusal plane
path of insertion and removal of RPD
path of displacement
use of
analyzing rod
carbon marker
undercut gauges
tripodding cast

final design
modify preliminary design if required following information from surveying cast
list tooth preparation required

tooth preparation
altering survey lines
guiding planes
occlusal/cingulum rest seats
embrasure widening

working Impressions, resurvey, finalize design

Lecture: Year 2 Term 2 Week 9
Title: Clinical and Laboratory Procedures
Lecturer: APLH Dias

(C1 = clinical stage, visit no. L = laboratory stage)

(C1) History, examination and diagnosis
preliminary impressions
facebow record
(L) study casts
treatment options
no prostheses
fixed prostheses
removable prostheses
implant supported prostheses
overdentures with/without attachments
preliminary design of RPD
survey
final design

(C2) Tooth preparation, working impressions, working casts
resurvey working cast, prescription to technician
(L) block undercuts, duplicate cast in refractory (+ stone cast)
(L) preparation of cast for laying of wax pattern
(L) wax pattern and addition of sprues
(L) investing and casting
(L) devesting, trimming and polishing framework

(C3) framework try in
(C + L) altered cast technique for free-end saddle RPDs
(L) addition of occusal rims

(C4) maxillo-mandibular relationship records
facebow record if required
selection of teeth, base shade
(L) articulating casts, setting up teeth, waxing up

(C4) try-in
protrusive record if required
(L) occlusal adjustments (if required), flasking, packing, processing and finishing

(C5) issue of RPDs
occlusal adjustments
instructions to patient

(C6) recall in 1 wk
review RPD, adjustments as necessary
recall at regular intervals

Lecture: Year 2 Term 2 Week 10
Title: Casting Failures
Lecturer: APLH Dias

Outline of process of casting Co-Cr framework
- wax pattern, sprues
- investing
- casting
  - casting machines

Defects in castings
- rough surfaces
  - air bubbles on wax pattern
    - moving/vibrating wax pattern after investing
    - low W/P ratio
    - prolonged heating
    - temp of alloy too high
    - high casting pressure
    - foreign substance in mould cavity
- finning
  - too rapid heating

- incomplete casting
  - insufficient venting
  - Incomplete elimination of the mould
    - low W/P ratio
    - insufficient heating of the alloy

- porosity
  - solidification shrinkage
    - localized shrinkage porosity
    - microporosity

  - gas
    - pinhole porosity
    - gas inclusions
    - subsurface porosity
  - air entrapped in mould

  - oversized or undersized castings
    - casting too large
      - excessive mould expansion
    - casting too small
      - insufficient mould expansion

  - distorted casting
    - distortion of wax pattern

Contents of lectures - Year 3

Lecture: Year 3 Term 2 Week 1
Title: RPD Failures
Lecturer: WC Chung

Sequelae of denture wearing

Destiny of partial denture

RPD failure

aesthetic failure -	patient's expectation
	poor design of components
	poor tooth selection/set-up
design failure -	inadequate/over design
	inadequate support/retention/resistance/stability
technical failure -	inadequate mouth preparation
	poor impression technique
	processing faults
mechanical failure -	tooth/base bonding failure
	fatigue failure of components
	casting defects
biological failure -	caries of abutment teeth
	periodontal disease
	accelerated residual ridge resorption

Procedures to prevent failure
- adequate ODTP
- good study models
- survey and design
- adequate patient/mouth/teeth preparation
- well executed techniques
- good communication with technician

Lecture: Year 3 Term 2 Week 3
Title: Transitional Partial Dentures
Lecturer: JE Dyson

Definition

Indications
- some remaining teeth have poor prognosis - *but that:*
- immediate extractions not required

Types
- to allow conversion to more extensive partial denture
- to allow conversion to complete denture

- tooth (tooth/mucosally) supported
- mucosally supported

Principles of design
- appropriate major connector (to allow attachment of additional teeth/saddles)
  - this may, however, unavoidably compromise remaining dentition
- appropriate base extension (border seal of converted denture)

Special requirements of impressions
- extension
- recording of supporting soft tissues

Jaw relationships
- establisment of:
  - occlusal plane
  - vertical dimension
- ICP *vs.* CJR
- recording techniques

Extending/converting transitional partial dentures
- clinical procedure
- laboratory procedures

Examples of clinical cases treated by transitional partial dentures

Lecture: Year 3 Term 2 Week 5
Title: Precision Attachments and Sectional Dentures
Lecturer: JE Dyson

Precision attachments

Introduction
- general description
- use on natural tooth abutments and implants
- historical background
  - *e.g.* Chaye's attachment (1906)
- role in restorative dentistry

Nomenclature (definitions)
- precision attachments (prefabricated attachments)
- semi-precision attachments (custom made attachments)

Parts
- matrix, patrix

Joint
- "fixed", movable, "stress-breaking" joint (springs)

Retention
- friction
- locking mechanism

Classification
- intracoronal
  - advantages/disadvantages
    - examples of prefabricated and custom made types
- extracoronal
  - advantages/disadvantages, examples
- studs
  - types, applications, examples
- bars
  - types, applications, examples
- miscellaneous
  - screws, posts, bolts, hinges *etc.*, examples and applications

Magnets
- use in overdentures

Advantages of precision attachments
- aesthetics
- retention, support, stability

Disadvantages of precision attachments
- tooth preparation
- expense/time
- technique sensitive
- requires careful treatment planning and preparation
- difficult to maintain and repair

Sectional dentures
- principles
  - use of multiple paths of insertion, examples
- problems/dangers associated with unilateral designs

Lecture: Year 3 Term 2 Week 9
Title: Partial Denture Revision
Lecturer: APLH Dias

Principles of designing RPD

Sequence of designing RPD
- mark missing teeth
- indicate probable undercuts
- outline saddle/s
- support saddle - occlusal rests etc.
- retain saddle - direct retainers (clasps, precision attachments)
  - indirect retention
- bracing
- major connector

Surveying
- brief description

Components of RPDs
- saddles
- occlusal rests and similar components
- direct retainers
- connectors

Contents of lectures - Year 4

Lecture: Year 4 Term 1 Week 1
Title: Assessment of the Complete Denture Patient
Lecturer: WC Chung

Complaint
- looseness, slacking
- inability to chewing
- pain
- poor appearance

History
- dental-extraction, reasons of tooth loss, denture history
- medical

Examination
- extra-oral - angular cheilitis, sunken cheeks, lip eversion
- intra-oral - arch form and resorption
  - denture bearing area - mucosal type, flabby ridge
  - anatomic landmarks and their significance
  - pathology - papillary hyperplasia., denture granuloma
- radiographic - bone quality
  - id nerve
  - retained roots
  - pathology

Diagnosis
- report of findings

Treatment plan
- removal of retained roots
- surgical corrections of anomalies/pathologies
- tissue conditioning
- new/duplication denture

Prognosis
- prediction of outcome of treatment plan

Lecture: Year 4 Term 1 Week 2
Title: Stages in Complete Denture Construction
Lecturer: WC Chung

Clinical stages
- stage 1 - ODTP, primary impression
- stage 2 - working impression
- stage 3 - jaw relationship records and facebow record
  - tooth shade and mould selection
- stage 4 - flat plane try in
  - protrusive record and condylar inclination setting
- stage 5 - balanced try in
  - base shade selection
- stage 6 - delivery
  - check record

Laboratory stages

stage 1 - study casts
custom trays
stage 2 - boxing of working impressions
working models
heat cured acrylic permanent bases
wax occlusal rims
stage 3 - mounting
teeth set-up in flat plane
stage 4 - teeth set-up in balance
stage 5 - process and finish in base acrylic
stage 6 - remount of lower cast

Lecture: Year 4 Term 1 Week 3
Title: The Complete Denture Base
Lecturer: JE Dyson

Requirements of the complete denture base (definitions)
- retention
- support
- stability

Retention
- outline of past theories
- description of current concept of the mechanism of retention
- need for border seal and close mucosal fit
  - means of achieving these
  - posterior border seal for mandibular and maxillary denture bases

Support
- factors influencing support
  - quality of underlying tissues
    - anatomical considerations
  - area of coverage
  - displacement of tissues
    - impression technique
    - displaceability of tissues

Stability
- (quality not only dependant on the bases)
- destabilising forces
  - tongue, lips, cheeks *etc.*
- characteristics of the ridge
- use of overdenture abutments as aids to stability

Techniques in base construction
- preliminary impressions
  - methods used and rationale
  - choice of materials
- preliminary casts
- design of custom trays
- secondary impressions
  - methods used and rationale
  - choice of materials
- production of secondary casts
- production of acrylic base

Use of permanent base *vs.* temporary base for jaw relationship records and trial insertions

Lecture: Year 4 Term 1 Week 4
Title: Jaw relationships for Complete Dentures
Lecturer: TW Chow

Posselt's envelope - revision

Changes when patient becomes edentulous

3 considerations:
- antero-posterior (horizontal)
  - most retruded/most anterior/uppermost position of condyle
  - brief introduction of centric relation/centric occlusion
  - reproducibility/prosthetic convenience
- transverse
  - brief discussion
- vertical dimension (discussed in detail)
  - importance
  - problems related to incorrect VD
  - detailed discussion:
    - what is VD?
    - where is VD?
    - how to arrive at the 'correct' VD?
  - commonly used clinical methods
    - measurement
    - aesthetics - looks good
    - phonetics - sounds good
    - complete zone - feels good

    } on right track
    - others

Lecture: Year 4 Term 1 Week 5
Title: Complete Denture Aesthetics
Lecturer: JE Dyson

Objectives in establishing a patient's appearance
- realism
- "beauty"
- compatabilty with functional aspects

Dental factors influencing appearance
- soft tissue support
- vertical dimension of occlusion
- occlusal plane
- tooth size, shape, shade, characterization
- tooth arrangement
- "gumwork" (contour, shade)

Use (and limitations) of pre-extraction records
- photographs
- study casts
- previous immediate replacement dentures
- radiographs

Concept of "harmony" in relation to appearance

Selection of artificial tooth mould
- size
  - guides to selection:
    interalar width = distance between tips of canines (arranged in arch)
    bizygomatic width/16 = width of central incisor
    distance between corners of mouth = distance between tips of canines
- shade
  - factors:
    colour (value, hue, chroma), gloss, opacity, fluorescence
- shape
  - facial shape as guide to selection
    - J. Leon Williams classification
      - square, tapering, ovoid

    (+ square-tapering, tapering ovoid, square-tapering-ovoid)
    - J.H. Lee classification
      - W/W, N/N, W/N, N/W

Arrangement of artificial teeth
- biometric guides
  - anatomical landmarks, relationship to ridges, incisive papilla
- asymmetry
  - rotations, tilting, spacing

Relationship and perception of size, lightness and position of anterior teeth

Simulated soft tissues ("gumwork")
- shade
- contour (gingiva, interdental papillae, mucosa)
- characterization

Common problems with complete denture aesthetics (examples) and their avoidance
- "small white teeth"
- teeth set too far back on ridge
- regular, symmetrical tooth arrangement
- "gumwork" without contour
- "candy pink" acrylic
- knife edged papillae
- intact incisal edges

Lecture: Year 4 Term 1 Week 6
Title: Complete Denture Occlusion
Lecturer: TW Chow

Definition of occlusion

Differences between natural and artificial occlusion

Jaw relationship - must be correct

While occlusion is tooth-to-tooth contact, tooth position re: biometric guide is important in setting of teeth.
- upper occlusal plane
  - level
  - orientation

lower occlusal plane
level - tongue control

'Balanced' occlusion/articulation
concept
determinants
Hanau's quint
Thielmann's "equation"
clinical significances
Bull rule
'unilateral balance' (group function) – a type of this used in this hospital
protrusive balance
concept
limitations

Occlusion for patients with skeletal
class II
class III

Lecture: Year 4 Term 1 Week 7a
Title: Complete Dentures using Duplication Techniques
Lecturer: JE Dyson

Rationale for using a duplication technique
enables desirable features in existing dentures to be selectively reproduced
more predictable outcome
reduced number of clinical appointments

Disadvantages
?laboratory work more demanding
?cost
may be difficult if the previous dentures are grossly unsatisfactory

Specific indications
dentures are worn down but otherwise satisfactory
particular features of existing dentures are identified as desirable
replacement for immediate replacement dentures
elderly patients with poor adaptability
convenience in domicilliary treatment

Techniques (clinical and laboratory stages)
assessment of existing dentures
methods of production of replicas
silicone moulds, agar, alginate
use of flasks, impression trays, soap box for duplication
production of replicas in cold cured acryic, wax or acrylic + wax teeth
impressions
modification of borders
open *vs.* closed-mouth ("functional") impressions
modifications to occlusal plane, lip support, VD
jaw relationship records
CJR
?situations where ICP of old dentures can be accepted
tooth selection
shade and mould
setting the teeth

use of index
wax try-in
assessment of trial dentures
delivery

Case presentations

Lecture: Year 4 Term 1 Week 7b
Title: Maintenance of Prostheses - Repairs, Relining and Rebasing
Lecturer: APLH Dias

Role of patient
regular and efficient cleaning of prostheses
keeping periodic review appointments
consult clinician if and when problems arise

Role of clinician
regular check of:
prosthesis
oral hard and soft tissues
remedy, identified problems, reinforce OHI *etc.*

repairs
fractured base
dislodged/fractured teeth
assess prosthesis for suitability for repair

reline
assessment of prosthesis for reline
reline
clinical procedure
laboratory procedure

Lecture: Year 4 Term 1 Week 8
Title: Immediate Replacement Dentures
Lecturer: JE Dyson

Indications
where all remaining teeth have very limited prognosis

Alternative approaches to treatment
clearance followed by 3 month healing period
transitional partial dentures later converted to complete dentures (preferred)
overdentures

Advantages of immediate replacement dentures against 3 month healing period
no period of "toothlessness"
prevention of development of abnormal habits
appearance of natural teeth can be reproduced
protection of extraction sites
(jaw relationship of natural teeth can be reproduced) - not a valid advantage

Disadvantages
3 month period without posterior teeth

no period of denture wearing experience prior to insertion
multiple extractions in one (final) stage
technical requirements
cost

Technique (c = clinical, l = laboratory stages)
(c) preparation
clearance of posterior teeth
(c) preliminary impressions
(l) pour casts, clinician designs custom trays, construction of custom trays
(c) secondary impressions (ZnO/E, ZnO/E + alginate, elastomeric material)
(l) pour casts, construct wax rims on stabilized bases
(c) contour rims, jaw relationship records
(l) mount, set up posterior teeth in wax
(c) try in posterior teeth
(l) cut teeth off cast and replace, clinician trims casts and plans surgery, complete flange, process and finish
(c) extractions, surgery, denture insertion, patient instruction

Follow-up and patient insructions
24 hours
inspection and adjustment
1 week
inspection and adjustment, suture removal, check record
over next 3 months
periodic inspection and adjustment, use of tissue conditioner
after 3 months
localised reline or rebase

Case examples

Lecture: Year 4 Term 1 Week 9
Title: Prosthodontic Treatment of the Institutionalized and Housebound Elderly
Lecturer: JE Dyson

The ageing society

Demographics
Hong Kong's elderly

General problems of the elderly
social
physical
psychological

Problems of obtaining dental services in Hong Kong

Existing treatment programmes for the elderly overseas

Perceived treatment needs *vs.* normative needs and realistic needs

Special considerations when treating elderly living in a group

Common dental problems of the elderly
tooth wear
recession

root caries
advanced periodontal conditions
persistent use of unsatisfactory dentures

Patient and carer education

Treatment planning considerations
general health, medical status, medications
psychological aspects
expectations and motivation
physical limitations
handicaps

Problems of delivery of dental care to institutionalized and housebound elderly

Basic equipment requirements

Minimizing the problem of equipment
use appropriate techniques
utilize on-site "equipment"
improvise
plan ahead

Appropriate restorative techniques
glass ionomer cements

Appropriate prosthetic techniques
partial denture types and designs
complete dentures using duplication techniques

Case examples
successes and failures

Lecture: Year 4 Term 1 Week 10
Title: Complete Dentures Opposed by Natural Standing Teeth
Lecturer: TW Chow

- includes opposing bridges and RPD

Difficulties
stability
aesthetics
support/occlusal forces

Maxillary natural dentition vs. mandibular complete denture
emphasis - extremely difficult
treatment options:
mandibular implant support overdenture
mandibular implant support bridge
maxillary clearance and C/-
refer

Single maxillary complete denture vs. mandibular natural dentition
concept/technique/procedures based on Winkler
except 'unilateral balance' rather than 'bilateral balance'.
occlusal analysis

mounted casts
occlusal plane analysis
diagnostic wax up
template for tooth reduction

Limitations should be recognized

Lecture: Year 4 Term 3 Weeks 1-5
Title: Implants 1-5
Lecturer: TW Chow

The course covers essential aspects of modern implantology using some of the teaching materials by Nobel Biocare (formerly Nobelpharma) and the cases treatedin the Hospital. The course is designed to give the undergraduate an overview and understanding of osseointegrated implants. Technical details are mentioned to illustrate principles

A) Introduction

History
Discovery of Ti
Histology - bone/Ti oxide interface
Surgical and prosthodontic principles
System : Brånemark
components : fixture (wide/narrow/regular platforms)
abutment - various types
prosthesis = suprastructure
bridge
overdenture
single tooth
surgery: 2-stage technique
prosthodontic : various, new components constantly evolving
screw retained/cemented

B) Treatment planning

Medical history
importance
absolute contraindications
relative contraindications
Reminder
reasons for replacement of teeth
options: none/bridge/RPD/implants
others: orthodontics/surgery
Diagnostics wax up - work backwards!
Ridge (bone) assessment:
The 2 "Q"s
quality
quantity
Radiographs/imaging techniques
OPG
PA
Scanora
CT scan

C) **Implants for edentulous patients**
Initial assessment
Make a good set of dentures first
Final assessment
Biomechanical considerations
Surgical stent
video on surgery
video on prosthodontics procedures
+ commentary by lecturer

D) **Implants for partially dentate patient**
Emphasis on TREAMENT PLAN
Assessment of ridge/saddle/space
Surgical stent
Anatomical precautions
video on surgeries in maxilla and mandible
video on prosthodontic procedures
+ commentary by lecturer

E) **Single tooth implant**
Treatment plan - important!
System - Ceraone
Surgical and prosthodontic aspects discussed in some detail to illustrate the difficulties and the level of care necessary.
Illustrated by cases treated in the Hospital

F) **Maintenance**
Plaque control extremely important
Gadgets/aids for cleaning

G) **Complications**
Briefly mentioned. Importance in adhering to protocol emphasized. Reinforced the message: obtain proper training before attempting implants, start off with specialists.

H) **Concluding remarks**

Lecture: Year 4 Term 3 Week 6
Title: Prosthetic Treatment of Cleft Palates and Post-Surgical Defects
Lecturer: WC Chung

Maxillofacial prosthetics as a sub-specialty of prosthodontics

Team personnel

Origin and nature of defects

Cleft palate
infant orthopedics
feeding appliance
speech appliance
definitive prosthetic rehabilitation

Immediate surgical prosthesis
rationale - function/hygiene/psycho-social

Procedures
preoperative guidelines
intra-operative procedures
post-operative guidelines

Hollow bulb obturator

Facial prosthesis

Functional reconstruction
titanium mesh
implant supported prosthesis

Reading List

Year 2

General Reading

* Academy of denture prosthetics : Principles, concepts, and practices in prosthodontics.
J. Prosth. Dent. 61(1):88-109, 1989.

Year 2 Term 3

Seminar 2.3.1 : Components of Partial Dentures

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 2, 3 & 4.
2. Miller, E.L. & Grasso J.E. : Removable partial prosthodontics. 2nd ed. 1981.
Ch. 8 & 9 : The design of structural units. p. 151-194.
3. Chow, Clark & Ho : A new ring clasp design.
J. Prosth. Dent. 59:638-639, 1988.

Seminar 2.3.2 : Surveying and Design

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 5 & 13.
2. Miller, E.L. & Grasso J.E. : Removable partial prosthodontics. 2nd ed. 1981.
Ch. 5 : The cast surveyor - the surveying procedure. p. 103-117.
Ch. 8 & 9 : The design of sturcture units. p. 151-194.

Seminar 2.3.3 : Problems of the Free-End Saddle

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 6.
2. Krol, A.J. : Clasp design for extension-base removable partial dentures.

J. Prosth. Dent. 29:408-415, 1973.

3. Eliason, C.M. : R.P.A. Clasp design for distal extension removable partial dentures.
J. Prosth. Dent. 49:25-27, 1983.

4. Lechner, S.K. : The distal extension saddle partial denture - a review.
Aust. Prosth. J. 59-64, 1987.

Seminar 2.3.4 : Partial Dentures with Anterior Saddle

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 7.

2. Zarb, Bergman, Clayton & Mackay : Prosthodontic treatment for partially edentulous patients. p. 458-462, 1978.

3. Chow, Clark, Clarke & Ho : A rotational path of insertion for Kennedy IV removable partial denture.
Brit. Dent. J. 164:180-183, 1989.

Seminar 2.3.5 : Mandibular Movement, Jaw Relations and Occlusion

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 1 & 8.

2. Ramfjord, S.P. & Ash, M.M. : Occlusion. 3rd., 1983.
Ch. 4 & 13 : p. 128-174, 384-424.

Seminar 2.3.6 : Anatomy in Relation to Impressions

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 15.

2. Zarb, G.A., Bolender, C.L., Hickey, J.C. & Carlsson, G.E. : Boucher's prosthodontic treatment for edentulous patients. 10th ed. 1990.
Ch. 7, p. 147-168 & Ch. 9, p. 194-223.

Seminar 2.3.7 : Selection of Impression Materials

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 13.

2. Combe, E.C. : Notes on dental materials. 4th ed. 1981.
p. 165-166, 168-171 & 176-179.
3. Miller, E.L. & Grasso J.E. : Removable partial prosthodontics. 2nd ed. 1981.
Ch. 4 : Obtaining the impression. p. 72-93.

Seminar 2.3.8 : Partial Denture Aesthetics

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 1.
2. Suggested chairside procedures for natural esthetics in complete dentures. Dentsply International Inc. 1978.
3. Murray, A.D. : Aesthetic considerations in removable partial denture design. Dental Annual 1989 : p. 201-210.

Seminar 2.3.9 : Oral Hygiene and Sequelae of Partial Denture Wearing

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 9 & 10.
2. Bergman : Periodontal reactions related to removable partial denture : A literature review.
J. Prosthet. Dent. 58:454-457, 1987.
3. Bergman & Ericson : Cross-sectional study of the periodontal status of removable partial denture patients.
J. Prosthet. Dent. 61:208-210, 1989.
4. Bergman, B., Hugoson, A. & Olsson, C.O. : A 25 year longitudinal study of patients treated with removable partial dentures.
J. Oral Rehab. 22(8):595-600, 1995.

Seminar 2.3.10 : Interim, Transitional and Overlay Dentures

1.* Clark R.K.F. (ed.) An introduction to clinical prosthodontics. HKU Press, 1988. Ch. 11 & 12.
2. Miller, E.L. & Grasso J.E. : Removable partial prosthodontics. 2nd ed. 1981.

Ch. 19 : The removable partial overdenture. p. 300-308.

Ch. 21 : The interim prosthesis and the treatment prosthesis. p. 326-333.

Supplementary Reading

Dental Technology.
Blakeslee, Richard W., (Mosby) 1980.

Clinical Removable Partial Prosthodontics.
Rudd, Steward & Kenneth, (Ishiyaku EuroAmerica) 1992.

Partial Removable Prosthodontics.
Kratochvil, James F., (Saunders) 1988.

Removable Partial Denture Construction.
Bates, John F., (Wright) 1978.

Dental Laboratory Technology : Prosthodontic Techniques.
Sowter, John B., (University of North Carolina) 1968.

Partial Dentures.
Neill, D.J., (Blackwell) 1983.

Removable Denture Prosthodontics, 2nd ed.
Grant, Alan A., (Churchill Livingstone) 1992.

* Compulsory Reading

Seminars Year 4 Term 2

Seminar 4.2.1 : Retention and Support (1)

1. An Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press, Ch. 17: 162-165.

2. Brill, N. Factors in the mechanism of full denture retention. A discussion of selected papers. (1967) *Dent. Pract.* **18** (9) : 9-19.

3. Jacobson T.E. & Krol A.J. (1983) A contemporary review of the factors involved in complete dentures. Part III : Support. *J. Pros. Dent.* **49** (3) : 306-313.

Further reference :

Murray, M.D. (1989) "The Theoretical Debate" in "Physical Aspects of Complete Denture Retention" (Ph.D. dissertation, University of Hong Kong) : 9-39.

Seminar 4.2.2 : Retention and Support (2) - Impressions

1. An Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press, Ch. 18: 166-176.

2. Neill D.J. & Nairn R.I. Complete Denture Prosthetics (2nd or 3rd ed.) Chapters on primary and secondary impressions.

Seminar 4.2.3 : Jaw Relations and Records (1) - Vertical Dimension

1. An Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press, Ch. 19: 177-179.

2. Nairn R.I. The concept of occlusal vertical dimension and its importance in clinical practice. In Mastication. eds. Anderson D.J. & Matthews B., J. Wright & Sons (1976) : 58-60.

3. Clark R.K.F., Chow T.W. & Cooke M.S. Orientation of the occlusal plane in Cantonese patients *J. Dent.* (1986) **14** : 262-265.

Seminar 4.2.4 : Jaw Relations and Records (2) - Anteroposterior Jaw Relations

1. An Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press, Ch. 20: 179-182.

2. Boucher's Prosthodontic Treatment for Edentulous Patients. 9th ed. 277-291 or 10th ed. 282-295.

3. Yurkstas A. & Kapur K. Factors influencing centric relation records in edentulous mouths. *J. Pros. Dent.* (1964) **14** : 1054-1065.

4. Helkimo M., Ingervall B. & Carlsson G.E. Variation of retruded and muscular position of mandible under different recording conditions. *Acta Odont. Scand.* (1971) **29** : 423-437.

Seminar 4.2.5 : Anterior Tooth Positioning and Selection

1. Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press : 191-196.

2. Neill D.J. & Nairn R.I. Complete Denture Prosthetics. 2nd ed. : 133-151 (or 3rd ed. : 65-69).

3. Suggested chairside procedures for natural esthetics in complete dentures. Published by Dentsply International Inc. : 8-13.

4. Watt and MacGregor : Designing Complete Dentures (1976) : 214-228.

Seminar 4.2.6 : Posterior Tooth Selection and Positioning.

1. Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press: 197.

2. Boucher's Prosthodontics Treatment of Edentulous Patients. 9th ed. : 334-343, 354-364.

3. Complete Denture Occlusion - International Prosthodontics Workshop. University of Michigan School of Dentistry : 145-153, 202-204.

Seminar 4.2.7 : Complete Denture Occlusion

1. Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press, Ch. 20 : 183-190.

2. Winkler - Essentials of Complete Denture Prosthodontics : 326-341.

3. Nairn, R.I. (1973) : Lateral and Protrusive Occlusions. *J. Dent.* **1** : 181-187.

Seminar 4.2.8 : Denture Insertion and Maintenance

1. Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press : 198-210, 206-207.

2. Neill D.J. & Nairn R.I. Complete Denture Prosthetics. 2nd ed. : 122-132 (or 3rd ed. : 101-113).

3. Neill D.J. A study of materials and methods employed in cleaning dentures. *Brit. Dent. J.* (1968) **124** : 107-115.

Seminar 4.2.9 : Diagnosis of the Complete Denture Patient

1. Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press : 207-210.

2. Neill D.J. & Nairn R.I. Complete Denture Prosthetics. 2nd ed. : 151-156 (or 3rd : 117-122).

3. Watt. D. Designing complete dentures : 229-234.

4. Clark R.K.F. The Problem Complete Lower Denture. *Dent. Update* (1978) **5** : 441-449.

Seminar 4.2.10 : Preparation of the Mouth for Complete Denture

1. Introduction to Clinical Prosthodontics. (1988) ed. Clark R.K.F., H.K.U. Press : 155-161.

2. Boucher's Prosthodontic Treatment for Edentulous Patients. 9th ed. Ch. 6 : 98-116.

3. Bastiaan R.J. Denture sore mouth, aetiological aspects and treatment. (1976) *Aust. Dent. J.* **21** : 375-382.

4. Gonzalez J.B. Use of tissue conditioner and resilient liners. *Dent. Clin. N. Amer.* (1977) **21** (2) : 249-259.

5. Faigenblum M.J. Retching its causes and management in prosthetic practice. *Brit. Dent. J.* (1968) **136** : 485-490.

Seminar 4.3.1 : Duplication of complete dentures and relining/rebasing

1. An introduction to clinical prosthodontics. ed. Clark, HKU Press Chapter 29, pp. 253-263.

2. Duplication of full dentures. Cooper J.S. & Watkinson A.C. (1976). *Brit. Dent. J.* **141**:344-348.

3. The versatility of the copy denture technique. Heath J.R. & Johnson A. (1981). *Brit. Dent. J.* **150**:189-193.

4. The clinical handling of dental materials. Smith B.G.N., Wright P.S. & Brown P. (2nd edition), pp. 117-120.

Seminar 4.3.2 : Overdentures

1. An introduction to clinical prosthodontics. ed. Clark, HKU Press Chapter 24, pp. 211-219.

2. Problems related to the successful use of overdentures. Fischer J.F. *et al.* (1983). *Quintessence Dent. Technol.* **10**:219-222.

3. The role of overdentures. Ralph J. & Basker R. in Gerodontology, edited by Barnes I. & Walls A. Chapter 15, pp. 135-145.

Seminar 4.3.3 : Implants

1. The evolution of implants over the last fifty years. Mah C. (1990). *Aust. Pros. J.* **4**:47-52.

2. Osseointegrated implants - principles and practice. Watson R.M., Forman G.H. & Davis D.M. (1989).

   Part 1 : Osseointegration and surgical techniques with the Nobelpharma Implant System. *Dent. Update* **16**:327-335.

   Part 2 : Prosthetic rehabilitation with osseointegrated implants. *Dent. Update* **16**:374-379.

   Part 3 : Case treatments with the Nobelpharma Implant System. *Dent. Update* **16**:426-430.

3. The implant-supported single-tooth restoration - preoperative evaluation and clinical procedure. Boudrias P. (1993). *Dent. Clin. N. Am.* **37**(3):497-511.

4. Single tooth replacement - expanded treatment options. Chan Richard W. & Tseng Thomas N. (1994). *Aust. Dent. J.* **39**(3):137-149.

Seminar 4.3.4 : Precision attachments

1. A review of attachments for removable partial denture design: Part I. Classification and selection. Burns D.R. and Ward J.E. (1990). *Int. J. Prosthodont.* **3**(1):98-102.

Seminars 4.3.5-7 : R.P.D. design and treatment planning

Practical sessions on design and treatment planning. Students advised to review the reading material recommended for the 2nd year course.