REPORT OF DUAL DEGREE COMMITTEE

The dual degree committee was formed by the Chairman Senate, vide letter no. DIR/IITK/2011/00-80.

The committee has the following members:

(1) Prof. CS Upadhyay
(2) Prof. K. Srihari
(3) Prof. RK Ghosh
(4) Prof. Balaji Prakash
(5) Prof. B. Dasgupta
(6) Prof. S. Qureshi

The mandate of the committee was to take into account the decisions of the senate with respect to the ARC report on the Dual Degree programme to be started at IIT Kanpur. The committee, as desired, met several times and created a set of guidelines and a template for the departments to fill up. The guidelines and sample template are attached below as ***Appendix I***.

Several requests were sent to all departments to fill up the templates and return them to the committee. The following is the final status:

Department	Status of template submission	Outside deptt. (course credits)	Inside deptt. (course credits)	Maximum intake from outside
Aerospace	Yes	32	43	10
BSBE	Yes	78-87 (new)	54 (new)	10
Chemical	Yes	60 (new)	60 (new)	Flexible
Chemistry	Yes	45	21	Flexible
Civil Engg.	Yes	63 (new)	63 (new)	20
Computer Sc.	Yes	-	54 (new)	**Not open**
Electrical Engg.	Yes	-	54 (new)	**Not open**
EEM	Yes	56-63 (new)	-	10
Math. & Stat.	Yes	164 (new)	90 (new)	10
Mech. Engg.	Yes	72 (new)	54 (new)	20% of strength
Material Sc.&E	Yes	24	24	Flexible
Physics	Yes	80 (new)	80 (new)	05
Design	Yes	63 (new)		10
HSS	Yes	126 (new)	72 (new)	15
MBA	Yes	*68 (old system) – 17 courses*	-	15

- **IE, LTP, Nuclear Engg., Robotics have not submitted templates.**

- **Mathematics and Statistics department has no thesis requirement.**

The detailed templates are given in ***Appendix II***. Program implementation details are given in ***Appendix III***.

Additional observations and recommendations:

(1) The dual degree template, especially for students from outside the department, needs to be refined further – after the PGRC completes the job of creating the PG template and PG course set.

(2) Several inter-disciplinary programs have not given a template. These programs should be encouraged to create the dual-degree templates.

(3) The departmental templates should be reviewed and refined after one or two years.

(4) Dual degree in MBA has to be treated separately, as this is a course-based program.

(5) Since credit calculation for PG courses does not explicitly exist (the new course templates have not been created), in some cases the old credit system is used.

CS Upadhyay K Srihari RK Ghosh B Prakash

B Dasgupta S Qureshi

Appendix I

DUAL DEGREE PROPOSAL

Preamble: As per the senate approved ARC document, each department is required to give a template of the credits/courses that will constitute a dual degree in the department. The scope of the dual degree has been broadened to include the possibility of cross-department M.Tech/MS/M.Des./MBA. Hence, the existing structure of dual degree needs to be enhanced. Towards this, the departments/centres/IDPs are requested to provide the template for the M.Tech/MS/M.Des./MBA part of the program.

Guidelines:

(1) The credit calculation can be based on the old system, or by using equivalent credits with the new system.

(2) The department should identify clearly the credit requirements for an M.Tech/MS/ M.Des./MBA degree.

(3) Mandatory course requirement has to be stipulated (as per current format, with likely change after PG-ARC is completed) for: (a) Students from within the department continuing onwards (can be the same as the existing Dual degree format), (b) **Students from other departments seeking the graduate degree**.

(4) Indicate the mandatory prerequisites (in terms of relevant UG courses) that need to be done before a student becomes eligible for an M.Tech/MS/M.Des./MBA option. This is essential for students from outside the department.

(5) Please indicate equivalent credits (taken elsewhere), which will be counted in lieu of any mandatory departmental prerequisite requirement. The new UG template should be used for this. In the example template this has to be specified in the "correspondence" column.

(6) The student should be able to use the OE slots judiciously to collect some of the relevant credits.

(7) The program will require one additional year for completion. The student should typically have at least one full semester (i.e. the tenth semester) for only research (MBA is an exception).

(8) Indicate specific numbers of (outside the department) students that can be accommodated.

(9) The students' academic program will be governed by the existing rules for Masters' level students, as given in the PG manual.

Sample Dual Degree (Masters Level) Template

Department Name: XXXXX

Total Mandatory credits for Dual degree for students from parent branch: UG component – XXXX; PG component- XXXX.

Total Mandatory credits for Dual degree students from other departments: UG component-XXXX;

PG component- XXXX.

Total credits of Masters' thesis: XXXX.

Maximum number of students from outside department that can be accommodated: XXX.

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department		
UG waiver	AE471	
Mandatory PG Credits	AE601; ME623	AE675 in lieu of ME623
Advanced Electives	XX credits of course work in topics relevant to specialization	
Thesis credits	XXX credits of thesis	
Students from outside departments		
Mandatory UG credits	Total credits: XXX (Specify list of courses. E.g. AE211; AE221; AE331; AE341...)	ME252 /CE221 in lieu of AE211; etc
Mandatory PG credits	XX credits of mandatory PG credits (Specify list of courses if desired E.g. AE601; AE671, etc)	
Advanced Electives	XXX credits of advanced electives	
Thesis credits	XXXX credits of thesis	
Any other Remark		

Appendix II

Detailed templates from various departments/IDPs

DEPARTMENT OF AEROSPACE ENGINEERING

DUAL-DEGREE (BT-MT) PROGRAM

IIT Kanpur has decided not to admit students directly to the Dual-degree program through JEE. However, the students can opt for the Dual degree anytime before the completion of the seventh semester. Furthermore, the dual degree program will not be restricted to the students of the same department but the students from other departments can also opt for the Master's degree in Aerospace Engineering after completing seven semesters in any other department at IIT Kanpur. Keeping this new paradigm in mind, there is a need to re-work the academic template for the PG part of the dual degree program. Following structure is proposed for the PG portion of the dual degree program:

1. **Students pursuing B. Tech in Aerospace Engineering**
   AE422 (Flight Lab)
   AE462 (Design II)
   M. Tech thesis: Equivalent to 32 credits in existing system
   4 DE's (in 8^{th}, 9^{th} or 10^{th} Semester): 4 X 9 = 36 credits

   Total credits for PG part: 43 plus thesis credits.

2. **Students from other departments**
   These students will be admitted to the specific streams (Aerodynamics, Propulsion, Structures and Flight Mechanics) like the regular PG students. Following is the proposed course structure:

   ESO courses: ESO202, ESO204, ESO201, ESO209 (or equivalent)

   Aerodynamics:
   AE601 (Introduction to Aerospace Engineering)
   Aerodynamics I (AE211/AE610)
   Aerodynamics II (AE311/AE611)
   4 relevant DE's (in 8^{th}, 9^{th} or 10^{th} Semesters): 36 credits
   M.Tech thesis: Equivalent to 32 credits in existing system

   Propulsion:
   AE601 (Introduction to Aerospace Engineering)
   Aerodynamics II (AE311/AE611)
   Propulsion I (AE341/AE650)
   Propulsion II (AE441/AE652)
   3 relevant DE's (in 8^{th}, 9^{th} or 10^{th} Semesters): 27 credits
   M.Tech thesis: Equivalent to 32 credits in existing system

Structures:
AE601 (Introduction to Aerospace Engineering)
Aerospace Structures (AE331/AE670)
Dynamics and Vibration (ESO209/AE688) or equivalent
4 relevant DE's (in 8^{th}, 9^{th} or 10^{th} Semesters)
M.Tech thesis: Equivalent to 32 credits in existing system

Flight Mechanics:
AE601 (Introduction to Aerospace Engineering)
Flight Dynamics (AE321/AE647)
Flight Stability and Control (AE322/AE648)
Aerodynamics I (AE211/AE610)
3 relevant DE's (in 8^{th}, 9^{th} or 10^{th} Semesters)
M.Tech thesis: Equivalent to 32 credits in existing system

Total credit requirement: 60-70 credits of course work plus thesis credits.
Total (outside) intake: 10

Dual Degree (Masters Level) Template

Department Name: Biological Sciences & Bioengineering

Total Mandatory credits for Dual degree for students from parent branch: UG component – 18; PG component- 36.

Total Mandatory credits for Dual degree students from other departments: UG component-42;

PG component- 36 to 45. Total coursework: 78-87credits.

Total credits of Masters' thesis: 72 credits

Maximum number of students from outside department that can be accommodated: 10

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department		
UG Mandatory	*UGP3 and UGP4 in 7^{th} and 8^{th} semesters*	
Mandatory PG Credits	BSE611, BSE680	
Advanced Electives	18 credits of course work in topics relevant to specialization – Any two relevant PG electives	
Thesis credits	72 credits of thesis	
Students from outside departments		
Mandatory UG credits	Total credits: 44 (LIF101, ESO 206, BSE211, BSE221, BSE311)	
Mandatory PG credits	36 credits of mandatory PG credits (BSE613, BSE632, BSE633, BSE640)	
Advanced Electives	9 credits of advanced electives (one from BSE629, BSE630, BSE631, BSE636, BSE638,	
Thesis credits	72 credits of thesis	
Any other Remark		

DEPARTMENT TEMPLATE for BT-MT Dual degree, CHEMICAL ENGINEERING
(5th To 10th SEMESTER: first and Second Year is a common program)

Department Name: Chemical Engineering

Total Mandatory credits for Dual degree for students from parent branch: UG and PG component (combined) – 60 credits.

Total Mandatory credits for Dual degree students from other departments: UG core requirement: 31 credits; UG and PG component (combined)- 60 credits.

Total credits of Masters' thesis: 81 credits

Maximum number of students from outside department that can be accommodated: Flexible.

*For students of Chemical Engineering, first four semester remains the same as BT. Four DEPT compulsory and a few DE has been taken. Courses to be taken for the M.Tech. part of the degree are shown in bold.

Department Template (5th semester)

V	ESO-3 (0ESO 214	3-1-3	14
	DEPT (D5-Heat transfer)	3-0-0	09
	DEPT (D6-Mass transfer)	3-0-0	09
	HSS-3 (Level 2)	3-0-0	09
	DE-1 (1/2module-optional)	0-0-4	04/00
	OE	3-0-0	09
	DEPT (D7- Process Sim. Lab)	1-0-2	05
	**Comm.. Skill (Deptt.)	0-0-2	02
			61/57

Department Template (6th semester)

VI	OE-1	3-0-0	09
	DEPT (D8-Rxn Eng.)	3-0-0	09
	DEPT (D9 Process control)	3-0-0	11
	HSS-5 (Level 2)	1-0-3(A=2)	09
	DEPT (D10-UO-Lab 1)	3-0-0	08
	DE-3/OE-3		09
			55

Department Template (7th semester)

VII	OE-4	3-0-0	09
	DEPT (D11-Process Design)	3-0-2	11
	DEPT (D12-UO Lab II)	1-0-3(A=2)	08
	OE-5	3-0-0	09
	DE-2	3-0-0	09
	DE(1/2module-optional)	0-0-4	04
			50/46

VIII-IX (summer)	CHE 699	0-0-9	**09**

Department Template (8th semester)

VIII	HSS-4 (Level 2)	3-0-0	09
	OE-3/DE-3	3-0-0	09
	OE-6	3-0-0	09
	DE-1	3-0-0	09
	DE-4/CHE699	3-0-0/0-0-9	09
	(Thesis)		09
			47

IX	CHE 699/DE-4	0-0-9/3-0-0	09
	CHE 699	0-0-9	09
	CHE 699	0-0-9	09
	CHE 699	0-0-9	09
			36

X	CHE 699	0-0-9	09
	CHE 699	0-0-9	09
	CHE 699	0-0-9	09
	CHE 699	0-0-9	09
			36

Students from outside departments (non-ChE):

- Mandatory core requirements: ESO204 (Fluid mechanics), ChE331 (Reaction engineering), ESO201 (Thermodynamics).
- PG part of courses same as that for ChE students (shown in bold in the template for semester V to semester VIII).
- Thesis units remain the same.

Dual Degree (Masters Level) Template

Department Name: CHEMISTRY

Total Mandatory credits for Dual degree for students from parent branch:

UG component – **99**; PG component- **21**.

Total Mandatory credits for Dual degree students from other departments:

UG component- **45**; PG component- **0.**

Total credits of Masters' thesis: **48/60** (48 for students from the department, and 60 for students from other department).

Maximum number of students from outside department that can be accommodated: **NO LIMIT.** However, maximum number of students will depend on the available positions among the faculties of the department for MS project.

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department		
UG waiver	-	
Mandatory PG Credits	75	CHM503, CHM402, CHM443 should be passed before the 9 th semester.
Advanced Electives	**3 DEs and CHM611, CHM621, CHM664**	
Thesis credits	48	
Students from outside departments		
Mandatory UG credits	45	Any Chemistry Department core courses
Mandatory PG credits	36	Courses **DEPT-1 -4** have to be picked from the basket of courses that include all the department core courses and electives

		offered, which are not credited by the student as SO/OE during his/her UG program.
Advanced Electives	DEs (but optional)	
Thesis credits	60	
Any other Remark	See Appendix 1	

Appendix -1

Department Of Chemistry

BS/MS course template for UG student from the Chemistry Department

Prerequite to register for MS Program: completion of the BS-Chemistry program and the courses CHM503 CHM402 CHM443.

Maximum number of students allowed for the MS program: NO LIMIT

Course requirement up to the sixth semester are the same in the BS templete.change in the subsequent semesters are marked in red-boldface.

Sem.	Course			Sem.	Course		
7	HSS-3 OE-3 OE-4 OE-5/DE-3 UGP3/OE/DE CHM423 CHM503	3-0-0 3-0-0 3-0-0 3-0-0 0-0-9/3-0-0 0-0-6 0-0-6	09 09 09 09 09 06 06 57	8	HSS-5 OE-1/DE-1 OE-6 DE-3/OE-5 OE-7 UGP4(Exrta credits) CHM402 CHM443	3-0-0 3-0-0 3-0-0 3-0-0 3-0-0 0-0-9 3-0-0 0-0-6	09 09 09 09 09 09 09 06 60/69
9	DE-4 DE-5 DE-6/OE-8 CHM611 CHM621 CHM664	3-0-0 3-0-0 3-0-0 3-0-0 3-0-0 3-0-0	09 09 09 09 09 09 **54**	10	MS Project	0-048	48 **48**

Courses part of the MS program	
CHM503	Organic Preparation Lab
CHM402	Organic Chemistry II
CHM443	Inorganic Chemistry Lab
CHM611	Physical Organic Chemistry
CHM621	Chemical Binding
CHM664	Modern Physical Methods in Chemistry (odd semester)

Note: DEs/OEs during the UG curriculum (i.e. during 6-8 semester) should not include CHM611, CHM621, and CHM664

Dual Degree (Masters Level) Template for CE

Department Name: CE

Total Mandatory credits for Dual degree for students from parent branch (CE): UG component – 362 (minimum); PG component – 63 (minimum course) + 80(minimum thesis). Computation is in Table 4.

Total Mandatory credits for Dual degree students from other departments: UG component-360 (minimum); PG component – 63 (minimum course) + 80(minimum thesis).

Total credits of Masters' thesis: 80 (minimum). Assuming 40 hours per week (8 hours per day) is equivalent to 40 credits. This is equivalent to transforming the present practice of 4 units to 10 credits.

Maximum number of students from outside department that can be accommodated: 20

Outline of the Dual Degree Program in Civil Engineering:

The department of civil engineering has 7 specialization at the level of master's. These are: Structural Engineering (STR), Geotechnical Engineering (GTE), Hydraulics and Water Resources (HWR), Environmental Engineering (EE), Transportation Engineering (TE), Engineering Geosciences (EG) and Geoinformatics (GI). In addition, a new generic and flexible interdisciplinary area is being proposed. In this, a student can do his/her thesis in an interdisciplinary area where the primary advisor will be from CE. There may be a co-advisor either from CE or from anywhere inside or outside the institute. The advisor will ensure that there is significant CE-content in the final work to justify a degree in CE. UG students from all departments cannot do the dual degree in all specializations of CE. Table 1 shows the UG background required for each specialization. The extra UG course that may be required over their UG background is specified in Table 2 and up to one UG course credit (out of PG 1 to PG 7) will be counted towards the PG credit of the dual degree in CE.

Irrespective of their choice of specialization, all students (CE or non-CE) will have to take a minimum of 7 PG courses (minimum 63 credits) and complete 80 thesis credits in order to fulfil the PG requirement(s) for a dual degree with MTech in CE. For the students with UG in CE, one PG course (~ 9 credits) may be replaced by a UG course on the recommendation of the thesis advisor. For the non-CE and interdisciplinary students, the actual number of PG courses may be 8 (72 credits) of which, a maximum of 2 courses (~ 18 credits) may be replaced by UG courses. Therefore, if a student requires 2 UG courses in order to build sufficient background in the area, he/she must take 8 courses (PG 1 through PG 8 of which 2 are UG courses). If a student requires none or 1 UG course, even then he/she may have to take 8 courses (PG 1 through PG 8). In all such cases, the extra requirement will be decided by the thesis supervisor(s) in consultation with the student.

The extra requirement of the 8^{th} course will not extend the resident requirement of the student because the students will be able to register for a maximum of 20 thesis credits in the summer between 8^{th} and 9^{th} semester. The PG course requirement may contain some compulsory courses depending on the specialization. The compulsory courses for all the specializations are shown in Table 2. One may note that the normal template does not have more than one compulsory UG course for any of the specializations. Since, it is possible to replace one of the compulsory PG courses in PG 1 through PG 7 by an UG course, minimum course credit requirement for both CE and non-CE students is 63.

Once a student (CE or non-CE) opts for the dual-degree MTech program in CE, an adviser will be identified in consultation with the student. In majority of the cases, the choice of the adviser will automatically decide the specialization of the student(s) and their course requirement(s) will be governed by that specialization. However, in some special circumstances, a student and/or adviser may decide to work in the interdisciplinary area. In such circumstances, the adviser will declare that at the time of enrolment with him/her and the course requirements of those students will be governed by the criterion specified for the interdisciplinary area (Table 2).

A sample template for the UG into a dual degree in CE is shown in Table 3. Table 4 shows a comparison of credits in different students of CE going segments for CE-BTech and CE-BTech-MTech dual degree program. A feasibility table for the non-CE students interested in the dual degree MTech in CE is given in Table 5.

Table 1: The UG department background required for each specialization.

Specialization	UG Department
Engineering Geosciences	CE, CHM, PHY, MME, ME, ECO
Environmental Engineering	CE, CHE, CHM, PHY, BSBE, MME, ME, MTH, ECO
Geoinformatics	CE, MTH, PHY, CSE
Geotechnical Engineering	CE
Hydraulics and Water Resources	CE, AE, ME, CHE
Structural Engineering	CE
Transportation Engineering	CE, AE, ME, MTH*, PHY*, ECO*
Interdisciplinary	Any. These students must first identify an advisor and the interdisciplinary problem area before enrolment.

*Must take ESO 202

Table 2: Compulsory course requirement for each specialization. Rest of the courses (out of the total of 7 or 8) are to be taken in consultation with the advisor. Course numbers for the UG courses are according to the new ARC document and the numbers for the PG course are the existing ones.

Specialization	CE Student	Non-CE student
Engineering Geosciences	CE 640, CE 641, CE 642	CE 321, CE 640, CE 641, CE 642
Environmental Engineering	EEM 602, EEM 603, EEM 606	EEM 602, EEM 603, EEM 604, EEM 606
Geoinformatics	CE 671, CE 677	CE 671, CE 677, CE 331
Geotechnical Engineering	CE631, CE632	-NA-
Hydraulics and Water Resources	CE610, CE611, CE612, CE613	CE610, CE611, CE612, CE613
Structural Engineering	CE 620, CE 621, CE 622, CE 623	-NA-
Transportation Engineering	CE 682 or CE 481, CE 683, CE 689 or CE 688, CE 690	ESO 202*, CE 682 or CE 481, CE 683, CE 689 or CE 688, CE 690
Interdisciplinary	To be decided by advisor(s)	To be decided by advisor(s)

*Compulsory for MTH, PHY and ECO graduates only.

Table 3. Template for B.Tech.-M.Tech. Dual Degree Program for CE-UG students.

First Semester			**Second Semester**		
S: MTH 101 (C)	3-1-0-0	11	**S:** MTH 102	3-1-0-0	11
S: PHY 103	3-1-0-0	11	**S:** PHY 102	3-1-0-0	11
S: CHM 101 (Lab)	0-0-3-0	03	**S:** PHY 101 (Lab)	0-0-3-0	03
TA: TA 101	2-0-3-0	09	**ES:** ESC 101	3-1-3-0	14
S: LIF 101	2-0-0-0	06	**S:** CHM 102	2-1-0-0	08
HSS: ENG 112/HSS-1 (Level 1)	3-1-0-0	11	**MPCFL:** PE102	0-0-3-0	03
MPCFL: PE101	0-0-3-0	03			
	Total	**54**		**Total**	**50**
Third Semester			**Fourth Semester**		
ES: ESC 201: Electronics	3-1-3-0	14	**HSS:** HSS-2 (Level 1)	3-1-0-0	11
ES: ESO-1: Mechanics of Solids	3-1-0-0	11	**S:** SO-3: Prob. & Stat	3-1-0-0	11
ES: ESO-2: Fluid Mechanics	3-1-0-0	11	**DC-2:** CE 242 CE Materials	3-0-2-0	11
DC-1: CE 211 Env Qual & Poll	3-0-3-0	12	**DC-3:** CE 272 Str. Analysis	3-0-0-0	09
TA: TA 201 (MSE)	1-0-3-0	06	**DC-4:** CE 262 Eng. Hydraulics	2-0-2-0	08
MPCFL: Composition (Web)	0-0-2-0	02	**TA:** TA 202 (ME)	1-0-3-0	06
	Total	**56**		**Total**	**56**
Fifth Semester			**Sixth Semester**		
ES: ESO-3: Numerical Methods	3-1-0-0	11	**DC-10:** CE 352 Fnd. Design	2-0-1-0	07
DC-5: CE 331 Geoinformatics	3-0-2-0	11	**DC-11:** CE 372 RCC Design	2-0-0-0	06
DC-6: CE 321 Engg Geosciences	2-0-2-0	08	**DC-12:** CE 382 Trans. Engg	3-0-0-0	09
DC-7: CE 351 Soil Mechanics	2-0-2-0	08	**HSS:** HSS-3 (Level 2)	3-0-0-0	09
DC-8: CE 371 Steel Design	2-0-0-0	06	**OE**	3-0-0-0	09
DC-9: CE 361 Engg. Hydrology	2-0-0-0	06	**DE(A) / DE(B)***		09/11
MPCFL: Comm Skills	0-0-2-0	02	**UGP1:** CE 332 (optional)	0-0-4-0	04
	Total	**52**		**Total**	**49-55**
Seventh Semester			**Eighth Semester**		
MPCFL: CE 441: Const. Mgmt.	2-0-0-0	06	**DE(A) / DE(B) / PG-1***		09/11
DE(A) / DE(B) / PG-1*		09/11	**PG-4**	3-0-0-0	09
DE(A) / DE(B) *		09/11	**PG-5**	3-0-0-0	09
PG-2	3-0-0-0	09	**PG-6**	3-0-0-0	09
PG-3	3-0-0-0	09	**PG-7**	3-0-0-0	09
HSS: HSS-4 (Level 2)	3-0-0-0	09	**HSS:** HSS-5 (Level 2)	3-0-0-0	09
	Total	**51-55**		**Total**	**54-56**
Ninth Semester			**Tenth Semester**		
TH: M.Tech. Thesis**		30/40	**TH:** M.Tech. Thesis		40
PG-8 (optional)**	3-0-0-0	09			
	Total	**39-40**		**Total**	**44**

***At least two DE must be from *Basket A*, i.e., DE(A). The third DE may be from *Basket A* or *Basket B*. (Details of these baskets are in the UG template of the CE department)**

****The PG-8 may be required for some students (to be decided in consultation with the advisor). In those cases, the MTech thesis registration in the ninth semester will be 30 credits and the 10 credits will have to be registered in the summer between 8th and 9th semester.**

Table 4. Comparison of Minimum Credit Allocation in BT and BT-MT dual degree for CE students

Course Group	Group Code	BT	BT-MT
HSS (excluding Management, comm. Skills etc)	HSS	49	49
Science (including electives)	S	75[a]	75[a]
Engineering Science (ESc, ESO)	ES	61	61
Technical Arts	TA	20	20
Management+PE+Comm Skills+Foreign Language	MPCFL	16	16
Department Core (Mandatory)	DC	101	101
Department Elective	DE	40[b]	31[b]
Open Elective	OE	54[b,c]	9[b,c]
PG Courses	PG	00	63[d]
PG Course (optional)	PG	00	9[e]
M.Tech. Thesis	TH	00	80[f]
Total		**416**	**505-514[g]**

[a]Does not include electives. Impossible to include as the students are free to choose.

[b]Minimum credits. May increase depending on the courses chosen by the student.

[c]May include some PG Courses.

[d]May include one UG course.

[e]May be a UG course.

[f]Credit computation of MTech Thesis has not been defined yet by the ARC. This assumes an equivalent of existing 4 course loads to 10 credits.

[g]The UG component in the BT-MT dual degree are highlighted in red which comes to a total of 362 credits (minimum). The PG credits are 143 (minimum).

Table 5. A guideline for the registration logistics for non-CE students

Semster	Registration for CE PG requirement(s)
Seventh	(PG-1, PG-2) or (PG-1, PG-2, PG-3)
Eight	(PG-3, PG-4, PG-5, PG-6) or (PG-4, PG-5, PG-6, PG-7) or (PG-3, PG-4, PG-5) or (PG-4, PG-5, PG-6)
Summer	0-20 thesis credits (as required in order to complete 40 thesis credits before the 10th semester)
Ninth	(40 thesis credits) or (PG-8 + 30 thesis credits) or (PG-7 + 30 thesis credits) or (PG-7 + PG-8 + 20 thesis credits) or (PG-6 + PG-7 + 20 thesis credits). PG-8 is optional and applicable only if it is required.
Tenth	40 thesis credits

Dual Degree (Masters Level) Template for CSE

For a dual degree the student opts for the M Tech degree at the end of the 6th semester. For the dual degree M Tech, a student must complete a total of 162 units. Of these at least 54 units are through course work corresponding to 6 courses PGI- PG6 and an M.Tech thesis worth at least 108 units (the current 4 units chunk is treated as a 12 units chunk in the new system). This is similar to the current dual degree program.

Dual degree course work worth 54 units:

Seventh semester: One of De3, DE4, OE2 must be a PG course-PG1.

Eight semesters: OE5-OE8 must be PG courses-PG2-PG5.

Dual degree thesis worth 108 units:

Eight semesters: 12 units

Summer (opt): 12 units

Ninth semesters: 36 units

Tenth semesters: 48 units

Summer semesters: 12 units

The template for the dual degree is:

Sem.	Course	L-T-L (Unit)	Sem.	Course	L-T-L (Unit)
7	PG1	3-0-0 (9) **9**	8	PG2-PG5 Thesis1	3-0-0 (36) 0-0-12 (12) **48**
Sum.	Thesis 2 (opt)	0-0-12 (12) **12**			
9	PG6 Thesis 3- Thesis 5	3-0-0 (9) 0-0-12 (36) **45**	10	Thesis 6- Thesis9	0-0-12 (48) **48**
Sum	Thesis 2 (opt)	0-0-12 (12)			

Dual Degree (Masters Level) Template

Department Name: **Design Programme**

Total Mandatory credits for Dual degree for students from parent branch: **NA**

Total Mandatory credits for Dual degree students from other departments: UG component-09 Credits; PG component- 54 credits plus thesis credits.

Total credits of Masters' thesis: 32 credits (old system).

Maximum number of students from outside department that can be accommodated: 10.

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department: NA		
Students from outside departments		
Mandatory UG credits	Total credits: 09	Art 105/Art 102/ME251/ TA 201/CS220/EE200
Mandatory PG credits	About 54 credits of mandatory PG credits	DES 601, DES 602,DES 603,DES 682,DES 681, and DES 626/DES 630/DES 633
Advanced Electives	*Nil* credits of advanced electives	
Thesis credits	32 credits of thesis (old system)	
Any other Remark	Summer Thesis of 8 credits (old system)	

Dual Degree (Masters Level) Template

Department Name: **HSS**

Total Mandatory credits for Dual degree for students from parent branch: UG component-105; PG component-72.

Total Mandatory credits for Dual degree students from other departments: UG component-54 (18+18+18);

PG component-72.

Total credits of Masters' thesis: 36(18+18).

Maximum number of students from outside department that can be accommodated: 15.

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department		
UG waiver	NONE	
Mandatory PG Credits	72 Credits(36+36)	
Advanced Electives	27-30 credits (about 3 courses)	
Thesis credits	36 credits	
Students from outside departments		
Mandatory UG credits	18+18+18=54 credits Micro I and II, Macro I and II, Econometrics/Regression Analysis, Econometrics II/Time Series Analysis, Probability and Statistics	
Mandatory PG credits	72 credits (8 DE=5+3 ADVANCED ELECTIVES)	
Advanced Electives	27-30 credits (about 3 courses)	
Thesis credits	32 credits of thesis	
Any other Remark	Summer Thesis of 8 credits	

Dual Degree (Masters Level) Template

Programme Name: EEM

Total Mandatory credits for Dual degree for students from parent branch: NA

Total Mandatory credits for Dual degree students from other departments: UG component-(0/9);

PG component- 56 credit (56/63).

Total credits of Masters' thesis: 36 (in old system)

Maximum number of students from outside department that can be accommodated: 10.

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department: NA		
Students from outside departments		
Mandatory UG credits	Total credits: 0	NA
Mandatory PG credits	36	EEM602, EEM603, EEM606, EEM702
Advanced Electives	20	EEM701, CE 412
Thesis credits	36 (old system)	
Any other Remark		

Dual Degree (Masters Level) Template

Department Name: IME

Total Mandatory credits for Dual degree for students from parent branch:

UG component – NA; PG component-NA.

Total Mandatory credits for Dual degree students from other departments: UG component- Nil

PG component- 68 (old credit system)

Total credits of Masters' thesis: Nil

Maximum number of students from outside department that can be accommodated: Fifteen (15)

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department: NA		
Students from outside departments		
Mandatory UG credits	Total credits: NA	
Mandatory PG credits	28 credits of mandatory PG credits: five out of the following: MBA 601, MBA 606, MBA 607, MBA 611, MBA 616, MBA 617, MBA 623, MBA 651, MBA 631, MBA 661, MBA 625 (intro. to mgmt.* - new course) + MBA 699I + MBA 699II+ MBA 697 (zero credit): Summer internship after eight semesters	
Advanced Electives	40 credits of advanced electives	
Thesis credits	Nil credits of thesis	
Any other Remark	Five open electives with the department during the UG programme and six courses in the each of two semesters during the V^{th} year	

Dual Degree (Master Level) Template

Department Name: Mathematics and Statistics

Total Mandatory Credits for Dual degree for students from parent branch:

UG component- 424 [Same as the BS template]

PG component:- 90 (6 DE+4 OE)[One DE in each semester, can be replaced with project work]

Total mandatory credits for dual degree students from other department:

UG component- 110 [10 department core courses]

PG component- 54 (6 DE)

Total credits of Master's thesis: NA

Maximum number of students from outside department that can be accommodated: 10

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department		
UG waiver	Nil	
Mandatory PG Credits	90(6DE +4 OE)	
Advanced Electives	Nil	
Thesis credits	NA	
Students from outside departments		
Mandatory UG credits	110 (10 department core courses)*	6 department core courses can be taken as OE during the UG study and the rest 4 can be taken in the fifth year also as OE
Mandatory PG credits	54 (6 DE)	
Advanced Electives	NA	
Thesis credits	NA	
Any other Remark	*Need the full list of approved curses from other departments to decide on the mandatory department core courses(s) than can be waived	

Dual Degree (Masters Level) Template

Department Name: **Mechanical Engineering**

Total Mandatory Credits for Dual Degree for Students from ME Department:

*UG component-**375,***
*PG component- **126.***

Total Mandatory Credits for Dual Degree Students from Other Departments:

UG component-XXX (as per Parent Department).
*PG component- **144.***

Total Credits of Masters' Thesis: **72** (~ 2 Full Semester Load).
Maximum Number of Students from Other Department that can be accommodated: 20 %.

Item	List of Courses/No. of Credits	Correspondence/Remarks
Students from ME Department		
UG Waiver	UGP2 , UGP-3 (ME451, 452: B.Tech. Project I and II) OE-5, OE-6 DE-3, DE-4	
Mandatory PG Credits	**54** credits (~ 6 PG elective courses relevant to the thesis, as per the advice of the Thesis Supervisor, 2 courses can be from outside the department)	AE675 in lieu of ME623
Advanced Electives		
Thesis Credits	**72** credits of thesis (~ 2 full semester load)	
Students from Other Departments		
Mandatory UG Credits	As per Parent Dept	
Mandatory PG Credits	**36** credits (~ 4 PG compulsory courses as per the chosen ME stream: SMD, FTS, MFS)	
Advanced Electives	**36** credits (~ 4 PG elective courses from ME Dept relevant to the thesis, as per the advice of the Thesis Supervisor)	2 courses can be ME UG courses of 3 rd or 4 th level)
Thesis Credits	**72** credits of thesis (~ 2 full semester load)	
Any other Remark		

Dual Degree Semester wise Template : for ME Dept UG Students

Semester	Dept choice		Credit
1	MTH101 (Calculus)	3-1-0	11
	PHY102/103	3-1-0	11
	PHY101/CHM101 (Lab)	0-0-3	3
	ESC101/ TA101 + LIF101	3-1-3/ 2-0-3 + 2-0-0	14/15
	ENG112/HSS-1	3-1-0	11
	* PE101	0-0-3	3
			53/54
3	SO-3 : (MTH203)	3-1-0	11
	ESC201 (Electrncs)/ HSS-2(Level-1)	3-1-3/3-1-0	14/11
	ESO-1 (ESO202 : Thermo)	3-1-0	11
	DEPT: (ESO206 : Eng Dyn)	2-1-0	8
	TA201 (MSE)	1-0-3	6
	DEPT: ME251 (Eng Dsgn & Graphics)	1-0-2	5
	Composition Web Based	0-0-2	2
			57/54
5	DEPT: ME321 (Adv Mech of Solids)	2-0-1	7
	DEPT: ME352 (Th of M/c & Mech)	2-0-1	7
	DEPT: ME341 (Ht & Ms Tr)	3-0-1	10
	DEPT: ME361 (Manf Tech)	3-0-1	10
	OE-1	3-0-0	9
	HSS-3 (Level 2)	3-0-0	9
			52
7	DEPT: ME401 (Enrgy Sys -II)	2-0-0	6
	HSS-4 (Level 2)	3-0-0	9
	OE-2/DE-2	3-0-0	9
	PG-1	3-0-0	9
	PG-2	3-0-0	9
	PG-3	0-0-9	9
	UGP: UGP-4 *	0-0-9	9
			51/60
9	M.Tech. Thesis		36
			36

Semester	Dept choice		Credit
2	MTH102	3-1-0	11
	PHY103/102	3-1-0	11
	CHM101/PHY101 (Lab)	0-0-3	3
	TA101 + LIF101 / ESC101	2-0-3 + 2-0-0/ 3-1-3	15/14
	CHM102	2-1-0	8
	* PE102	0-0-3	3
			51/50
4	HSS-2(Level 1)/ ESC201(Electrncs)	3-1-0/3-1-3	11/14
	ESO-2: ESO210 (Intr to Elec Eng)	3-1-0	11
	ESO-3: ESO204 (Mech of Solids)	3-1-0	11
	TA202 (ME)	1-0-3	6
	DEPT: ME231 (Fluid Mech)	3-0-1	10
	DEPT: ME222 (Nat & Prop of Mat)	2-0-1	7
			56/59
6	DEPT: ME351 (Desn of M/C El)	2-1-0	8
	DEPT: ME354 (Vib & Cont)	3-0-1	10
	DEPT: ME301 (Enrgy Sys -I)	3-0-1	10
	DE-1 / HSS-5 (Level 2)	3-0-0	9
	DE-2 / OE-2	3-0-0	9
	OE-3	3-0-0	9
	UGP: UGP-1 *	0-0-4	4
			55/59
8	DEPT: ME461 (Manf Sys)	3-0-0	9
	HSS-5 (Level 2) / DE-1	3-0-0	9
	OE-4	3-0-0	9
	PG-4	3-0-0	9
	PG-5	3-0-0	9
	PG-6	3-0-0	9
			54
10	M.Tech. Thesis		36
			36

UG Credits: = 375 Credits

PG Credits: = 126 Credits

MSE Dual Degree (Masters Level) Template

Department Name: Materials Science and Engineering

Total Mandatory credits for Dual degree for students from parent branch:

UG component – NIL; PG component- *minimum 24*

Total Mandatory credits for Dual degree students from other departments:

UG component- *none* PG component- *minimum 24*

Total credits of Masters' thesis: *minimum 32*

Maximum number of students from outside department that can be accommodated:

no limit right now; constraints to be placed based on experience

Item	List of Courses/ No. of credits	Correspondence/Remarks
Students from within the department		
UG waiver	Up to 2 DE courses can be used in the PG part	
Mandatory PG Credits	NONE	
Advanced Electives	Minimum of 24 PG course credits in consultation with the thesis supervisor	
Thesis credits	Minimum of 32 thesis credits.	
Students from outside departments		
Mandatory UG credits	NONE	
Mandatory PG credits	See "Any Other Remark" below.	
Advanced Electives	Minimum of 24 PG course credits in consultation with the thesis supervisor (this will include PG courses (if any) specified under "Any Other Remark").	

Thesis credits	Minimum of 32 thesis credits.	
Any other Remark	Depending on the courses a student has successfully completed in the UG part, he/she may have to do one or more of the following PG courses (credits for these PG courses will be included in the required 24 credits of course work): MSE615: "Structure and Characterization of Materials" (waived only if ESO205 : "Nature and Properties of Materials" taken) MSE616: "Thermodynamics of Materials" (waived if an equivalent course taken in the UG part, e.g., MSE201: "Thermodynamics & Phase Equilbria") MSE626N: "Transport Phenomena" (waived if an equivalent course taken in the UG part, e.g., MSE202 : "Rate Processes")	

Dual Degree (Masters Level) Template

Department Name: **PHYSICS**

Total Mandatory credits for Dual degree for students from parent branch: (UG + PG) - [80];
PG component - Nil.

Total Mandatory credits for Dual degree students from other departments: (UG + PG) - [80];
PG component - Nil.

Total credits of Masters' Project: [44]

Maximum number of students from outside department that can be accommodated: 5

For students from within and outside the Physics Department		
Item	**List of Courses/No. of credits**	**Correspondence/Remarks**
UG waiver	Nil	
Mandatory UG credits	1. Mathematical Methods II (Phy 422) [11] / Measurement Techniques [*] 2. Quantum Mechanics II (Phy 432) [11] 3. Experimental Physics II (Phy 462) [8] 4. Electrodynamics II (Phy 553) [11] Total credits: [41/*]	As pre-requisites for the MS Project, these courses need to be completed during the BS part of the programme. * Course to be floated, credits not fixed
Mandatory PG Credits	Nil	
Advanced Electives	Nil	
Thesis credits	Nil	

Template:

Semester I	**Semester II**
Department Elective [9]	Department Elective [9]
Open Elective [9]	Open Elective [9]
MS Project PHY 563 [11]	MS Project PHY 566 [11]
MS Project PHY 565[11]	MS Project PHY 568 [11]

APPENDIX III

Implementation of the Dual degree program

The proposed Dual Degree program has three major components:

(1) Students admitted to the B.Tech/BS program in a department migrating to the PG part of the program (Category A).

(2) Students admitted to B.Tech/BS program in a department, but wanting to go for the PG part of another program (Category B).

(3) Students admitted to the B.Tech/BS program but wanting to go for MBA as a dual degree option (Category C).

Some points with respect to student record management:

(1) Assign the dual roll number, as is being currently followed, when the student migrates to the PG program. The numbering may follow a convention to identify the department for the PG part.

(2) The PG record should be reconciled with the UG record at the end of the program, clearly indicating the courses that have been taken towards the PG part.

(3) For PG CPI calculation, all mandatory UG credits for the PG program plus all PG courses required for the PG part will be counted towards the PG CPI calculation. The UG CPI will be calculated using usual UG credits of the parent department with a waiver of 27-36 credits from the OE slot. The student should apply for the waiver, after migrating to the PG part of the program. In case the student does not migrate to the PG part, then some of the additional credits earned can be counted towards fulfilment of the OE credits.

Academic Load and proposed road-map:

The normal desired additional course load for the students of Categories B and C is about 60-120 credits. Since it is desired that the student gets sufficient time in the 9^{th} and 10^{th} semesters to do the thesis work, such students should be given options to complete the mandatory course work by the 9^{th} semester – except in the case of MBA and programs which are course intensive. Since these students, as well as those in Category A, can use the OE judiciously to complete the course requirements, it is recommended that:

(1) These students should be allowed to use the OE slots, and overloads, in consultation with the DUGC convener of the parent department and the host department for the PG part of the program. The overloads and use of OE slots, to complete the course work, should be allowed from the time the student is given the program change.

(2) A student opting for the dual degree program will not be allowed to do either a minor or a dual major. This is to allow for a smoother management of course-work, and to reduce clashes and difficulties with placement of courses by departments.

(3) All departments that require certain mandatory UG/PG credits should position these courses in a “floating” slot, so that the students with program change (or with an intention to change their program) can register for these courses without any clash. Dedicated slots (maybe 5:00 to 6:00 pm) may be reserved for these courses. Such registrations should be preferably allowed for students who are in the 6^{th} semester of their UG program or further.

(4) The OARS should allow registration for mandatory laboratory courses, if any, if the instructor arranges alternate times for the program change students – without changing the normal schedule of the laboratories.

(5) The program change students should be allowed to take relevant courses in the summer (upto 23 credits) after the eighth semester, if offered.

For the success of the Dual degree and Dual major options, it is imperative that the summer term is looked at afresh. Summer has to be treated as an accelerated regular semester, meant not only for clearing credit deficits (i.e. a remedial term) but also for good students to garner the extra credits required for the dual degree and dual major. Faculty should be encouraged to offer the relevant courses in summer with appropriate incentives like reduced load/no load in a subsequent semester plus suitable monetary benefits (in line with the practice in several leading universities in the West). Students should also pay a suitable fee for the summer term (in tune with the regular semester), to earn the summer credits.

(6) The departments should work out a clear road-map for the students migrating to them under categories B and C.

(7) The senate should set up a "Dual Degree Implementation committee" to streamline implementation of this new initiative, and to create a robust mechanism. The implementation committee will interface with all the departments to make the transition smooth for the students, especially for categories B and C.

The program change rules governing various categories:

(1) **Category A**: The current program change rules for change to Dual Degree program should be applied, i.e.

(a) Student can apply for program change to Dual degree in the department from the sixth semester to the beginning of the eighth semester of his/her UG program (the semesters that the student has attended are only counted, excluding semester drops).

(b) The student should have a minimum CPI of 6.0, at the time of applying.

(c) The student should have cleared all current non-OE credits of the department, as per the undergraduate template of the department, at the time of applying.

(d) Migration to the M.Tech part of the program will be done only when the student has completed all the mandatory credit requirements upto the seventh semester, from the undergraduate part of the program.

(e) The M.Tech part of the program change will be withdrawn if the student accumulates more than 40 credits of backlog by the end of the eight semester.

(f) Request for withdrawal from the M.Tech/M.S. part of the program will be entertained at anytime during the course of the UG/PG program. The request should be made to the Chairman SUGC, through the DUGC convener of the department.

(g) Application for program change should be made to the Chairman SUGC, through the DUGC convener of the parent department.

(2) **Category B and C**: For students wanting to opt for an M.Tech/ M.S./MBA in a department that is not his/her parent department, the following rules apply:

(a) Students can apply for the M.Tech/M.S./MBA program in a different department, at the end of the sixth semester of their academic program.

(b) The student should have no backlogs, with respect to the UG template of their parent department, at the time of application.

(c) The student should have a minimum CPI of 6.0 at the time of application. Dual degree option should be given against the desired options, according to availability of seats and CPI of the student. Some departments may wish to implement additional norms, e.g. interviews or written tests, for students wishing to pursue the PG program. *However, it is felt that the CPI based norm (similar to the usual branch change rules) should be easier to implement*.

(d) Migration to the PG program will be done only after all credit requirements, for an undergraduate degree in the parent department, are completed.

(e) The student may wish to not continue with the PG program at the end of his/her regular B.Tech/B.S program. Approval for withdrawal will be given against a written request to the Chairman SUGC, through the DUGC convener of the parent department.

(f) The PG program change will be withdrawn if the student accumulates more than 40 credits of backlog by the end of the eight semester of his academic program.

(g) Application for program change should be made to Chairman SUGC, through DUGC convener of the parent department.

APEC Rules for BT-MT Dual degree students:

(1) The students in the BT-MT program will be governed by the extant APEC rules for the UG part of the program till the student officially migrates to the PG part of the program. In the PG part of the program, the student will be governed by the extant APEC rules for PG students.

(2) In case the PG part of the program is terminated, the student will be required to complete the mandatory courses of the B.Tech/BS program of the parent department. However, courses taken from the PG template in lieu of the OE options may be counted as OE courses.