



WOOD SCIENCE AND TECHNOLOGY: CURRICULUM DEVELOPED FOR FUTURE CHALLENGES IN WOOD- BASED INDUSTRY

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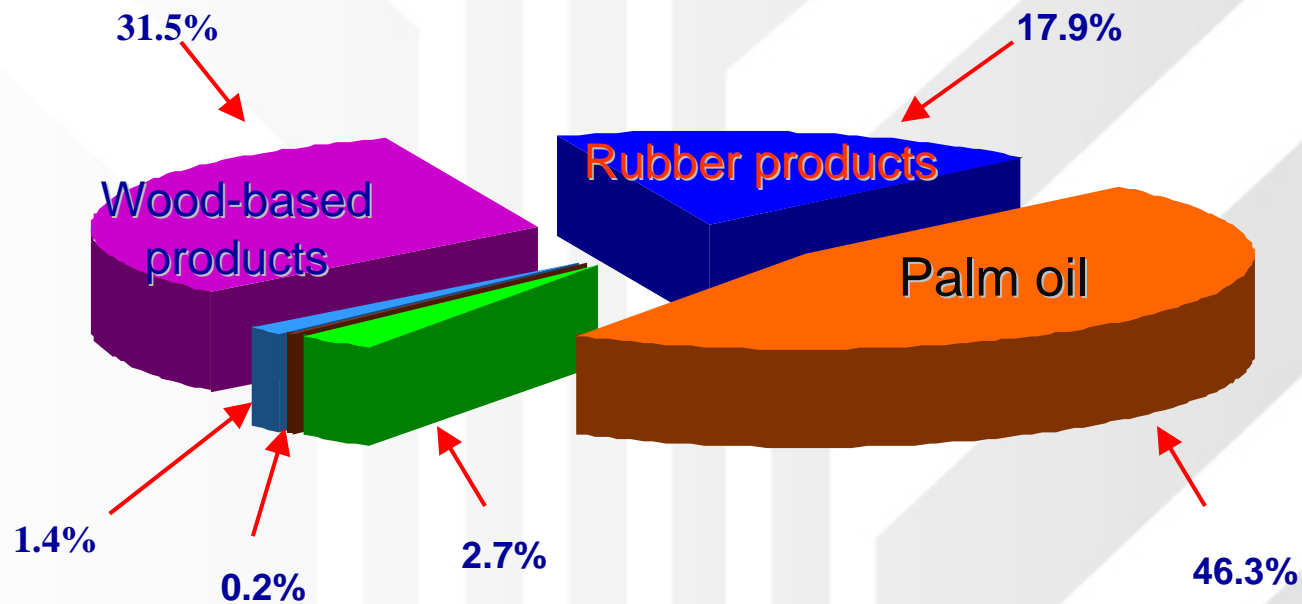
BACKGROUND

- Faculty of Forestry – One of the three founding faculties of UPM, Established in 1971
- Offered Bachelor of Forestry Science with seven minors
- Ph.D (related forestry fields)
- MSc with thesis
- Master in Wood Industries Technologies
- Master in Tropical Forest Resource management



PERCENTAGE OF PRIMARY COMMODITIES & COMMODITY-BASED PRODUCTS FROM TOTAL PRIMARY COMMODITIES EXPORT (2004)

Source : Statistics Department of Malaysia



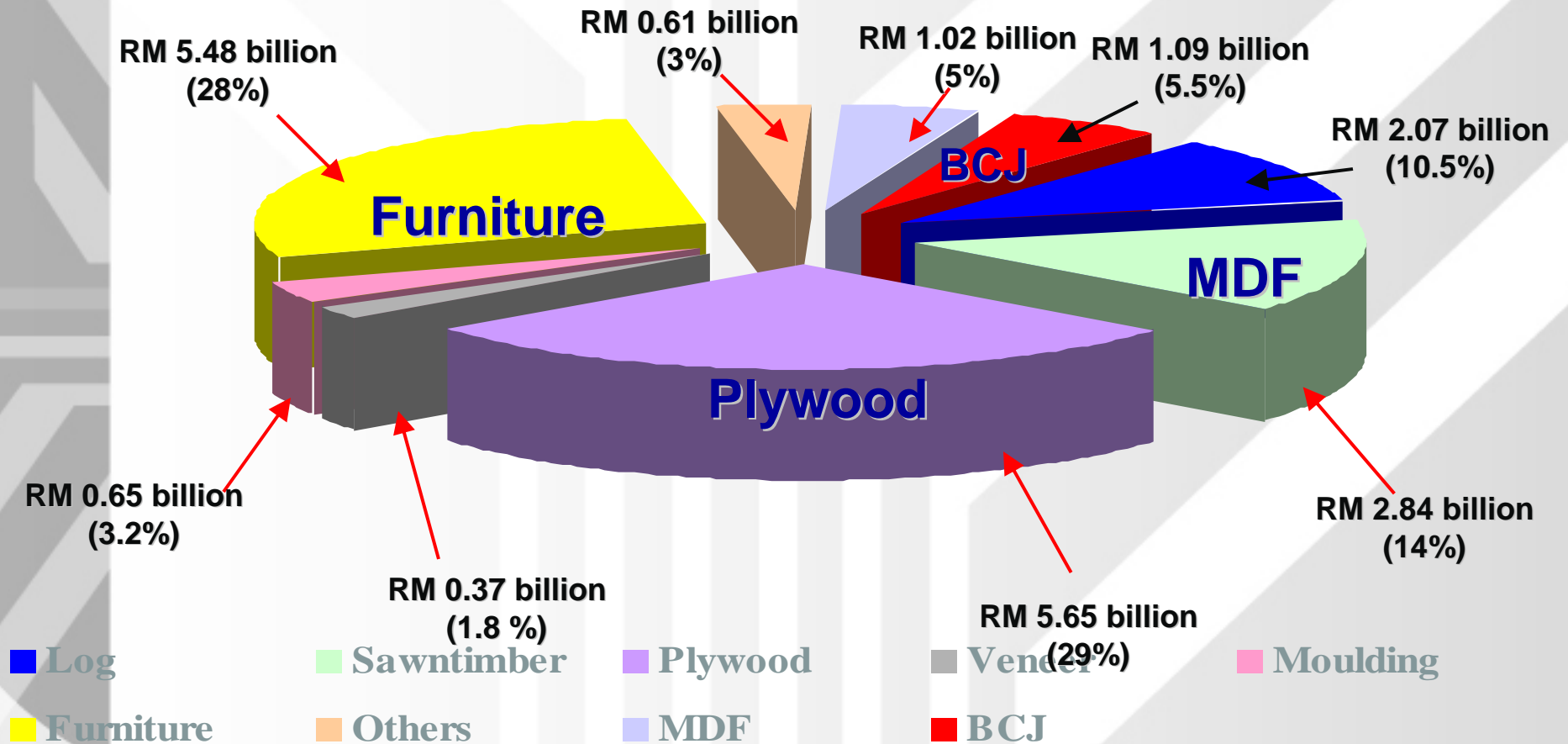
- Rubber (RM 11.23 billion)
- Cocoa (RM 1.70 billion)
- Tobacco (RM 0.85 billion)

- Palm Oil (RM 29.09 billion)
- Pepper (RM 0.14 billion)
- Wood-based (RM 19.76 billion)

TIMBER PRODUCTS THAT CONTRIBUTE TO THE NATIONAL EXPORT (2004)



TOTAL EXPORT : RM 19.76 BILLION
 FORECAST (2005) : RM 22 BILLION
 FORECAST (2006) : RM 24 BILLION



Source : Malaysian Timber Industry Board

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Current Raw Materials for Wood-based Industries



- **SOURCE OF FIBRES**
- Natural Forest ~ 25 mill. m³/yr
- Rubberwood ~ 9.3 mill m³/yr
- Oil Palm Fibre ~ 30 mill. ton/year
- Post Harvest Forest Residues ~ 10 mill. M³/yr
- Bamboo ~ 10 mill. culms/yr

THE MALAYSIAN WOOD INDUSTRY



In 2003: Bio-Composite, Wood-based, Pulp & Paper Industry, Malaysia:

- Total Annual Revenue Generated
~ USD 8 billion.
- High Capital Intensive & Export
Oriented (USD 3.9 billion export value)

Plywood : 2nd in World Export of Tropical Plywood

MDF : 3rd in World Export

Furniture : 10th in Global Furniture Export

Sawntimber : Top Exporter in Tropical Timber

Log : Leading Exporter Tropical Log





JUSTIFICATION OF BACHELOR OF WOOD SCIENCE TECHNOLOGY (BWST) PROGRAM

1. Human resource

- In 2005, Forestry industries contributed RM25 b in terms of export commodity (5% of export revenue) (Statistic 2005)
- Job opportunity 337,000, majority from downstream processing



WOOD-BASED INDUSTRIES DISTRIBUTION IN MALAYSIA 2004

Industries	Peninsular Malaysia	Sarawak	Sabah	Total
Sawmill	657	318	261	1,236
Plywood and composite mills	76	67	242	385
Furniture and joinery	2,724	359	91	3,174
Pulp and paper	3	-	1	4
Pencil, matches and picture frame	7	2	1	10
Total	3,467	746	596	4,809

Sources: JPSM, JH Sabah dan JH Sarawak statistics (2004).



ANALYSES OF JOB OPPORTUNITY FOR BWST GRADUATES

Year	Available Jobs In wood Sectors	Professional Workers	New Job Opportunities for professional	Available Jobs In Public Sectors	Available Jobs in Public and Private Sectors	BWST Graduate From UPM	Graduates From Other Public Universities	Total Graduates In Wood Sectors	Excess/Deficit of Jobs
2004	337,000	10,110							
2005	351,154	10,535	425	21	446	-	100	100	346
2006	365,902	10,977	442	22	465	-	100	100	365
2007	381,270	11,438	461	23	484	-	100	100	384
2008	397,284	11,919	480	24	504	-	100	100	404
2009	413,970	12,419	501	25	526	-	100	100	426
2010	431,356	12,941	522	26	548	60	100	160	388
2011	449,473	13,484	544	27	571	60	100	160	411
2012	468,351	14,051	566	28	595	60	100	160	435
2013	488,022	14,641	590	30	620	60	100	160	460
2014	508,519	15,256	615	31	646	60	100	160	486

Nota: ¹Malaysian Timber Council Report 2004 ² Revised 8th Malaysian Plan (RM8)



JUSTIFICATION OF BWST PROGRAM

2. 5 years Plan and National Development Policies

- Agriculture sector including forestry – the third engine of growth in Malaysia socio-economy development
- BWST program is in line with the government policy to enhance agriculture education including forestry
- IMP2 1996-2005 - Emphases on 2 approaches, entire value chain and development of cluster based industry. For wood-based industry, the prime focus are on the manufacturing of lignocellulosic composite products

The changes of these policies provide opportunity for the wood-based industry to develop high value-added products with the aid of high technology. This would provide job opportunity for the BWST graduates.



JUSTIFICATION OF BWST PROGRAM

3. Current demand towards Technologist and Scientist

Lacking of Wood Technologist and Scientist

- The needs of skilled professional in operating high technology equipments and design of new value-added products
- The needs of competent manager



OBJECTIVES OF BWST PROGRAM

- To produce graduates with comprehensive knowledge in managing forest resources efficiently
- To produce graduates with high skill in manufacturing technology and processing of wood and lignocellulosic resources with emphasis on reduced environmental impact
- To produce graduates with ability to manage production and processing of timber and other forest products



LEARNING OUTCOME

After following this program, students will :

1. gain comprehensive knowledge in Wood Science and Technology
2. possess right professionalism, value, attitudes and ethics
3. possess social accountability
4. able to communicate well and work as a team
5. have competent in managing information and able for life long learning
6. able to think critically
7. have skills as manager and entrepreneur



PERCENTAGE OF LEARNING OUTCOME BASED ON COMPONENTS

Category	Number of courses	Percentage	MPTN 2002* (%)
Concept and theory	74	53.2	40-60
Humanity	21	15.1	15-25
Skill	44	31.7	15-45

*Garis panduan MPTN (Surat Rujukan KP.S(PT) 7412(92) bertarikh 10 Julai 2002)



MARKET SURVEY ON BWST PROGRAM

- Respondents: Wood-based industries, Industrial associations, Public sectors,
- Results of survey:
 1. All respondents agreed with BWST Program
 2. All respondents agreed with the structure of the program
 3. Majority agreed to provides at least 1-3 job opportunity for the graduates with a starting salary in the range of RM1500-RM2000 (USD 500~ 700)
 4. Majority agreed BWST able to produce competent graduates in related field



CURRICULUM STRUCTURE

- Bachelor of Wood Science and Technology (BWST)
 - Two Options: 1. Biocomposite Technology
2. Wood Industry Management
- 135 credits with structured and unstructured courses
- Program duration 8 semesters including one-semester off for Industrial training



GROUP OF COURSES IN BWST PROGRAM

Group	Credit	Percent (%)	UPM 2003* (%)
University courses	24	17.8	15-20
Core courses	77	57.0	55-60
Option/ elective courses	34	25.2	25-30
Total	135	100	100

*Cadangan Majlis Pengajian Tinggi Negara seperti dalam Perkara Akademik UPM, 2003



UNIVERSITY COURSES

COURSE CODE	COURSES	CREDIT
ACT2111	BASIC PLANNING AND USAGE OF FINANCIAL INFORMATION	3 (2+1)
BBI2412/BBI2415	ENGLISH LANGUAGE*	3 (3+0)
EDU3043	THINKING SKILLS	2 (2+0)
KOM3403	PUBLIC SPEAKING	3 (3+0)
MTH3003	STATISTICS FOR APPLIED SCIENCES	4 (3+1)
SKP2101	MALAYSIAN NATIONHOOD	3 (3+0)
SKP2203	ISLAMIC AND ASIA CIVILISATION	2 (2+0)
SKP2204	ETHNIC RELATION	2 (2+0)
PRT xxxx	MAN AND AGRICULTURE	2(2+0)
	TOTAL	24



CORE COURSES

KOD KURSUS	KURSUS	KREDIT
FHH3516	WOOD AND FIBER ANATOMY	3 (2+1)
FHH3517	WOOD AND FIBER PHYSICS	3 (2+1)
FHH3518	WOOD AND FIBER CHEMISTRY	3 (2+1)
FHH3519	WOOD COMPOSITE I	3 (2+1)
FHH3509	NON-WOOD FOREST PRODUCTS	3 (2+1)
FHH3511	PULP AND PAPER TECHNOLOGY	3 (2+1)
FHH3512	FOREST PRODUCT MARKETING	3 (2+1)
FHH3520	WOOD SEASONING	2 (1+1)
FHH3521*	LOGS AND WOOD PROCUREMENT	3 (2+1)
FHH3522*	SAWMILLING AND WOOD MACHINING	3 (2+1)
FHH3523*	WOOD DETERIRATION AND TREATMENT	3 (2+1)
FHH3524*	WOOD ADHESIVES AND ADHESION TECHNOLOGY	3(2+1)



CORE COURSES

COURSE CODE	COURSES	CREDIT
FHH3525*	POLLUTION IN FOREST INDUSTRIES	3 (3+0)
FHP3105	FOREST SILVICULTURE	4 (3+1)
FHP3112	DENDROLOGI I	3 (2+1)
FHS3901*	FOREST CAMP	1 (0+1)
FHS3902*	INDUSTRIAL TRAINING	12 (0+12)
FHU3203	FOREST MENSURATION IN FORESTRY	3 (2+1)
FHU3204	COMPUTER METHODS	3 (2+1)
FHU3205	QUANTITATIVE METHODS IN FORESTRY	4 (3+1)
FHU3213	FINANCIAL ANALYSIS OF WOOD INDUSTRIES	3 (2+1)
FHU3218*	WOOD INDUSTRY ECONOMY	3 (3+0)
FHU3219*	INTRODUCTION TO FORESTRY SCIENCE	3 (3+0)
	TOTAL	77



BIOCOMPOSITE TECHNOLOGY OPTION

COURSE CODE	COURSES	CREDIT
FHH3515	FURNITURE PROCESSING TECHNOLOGY	3 (2+1)
FHH3526*	WOOD MECHANICS	3 (2+1)
FHH4504*	WOOD COMPOSITE II	3 (2+1)
FHH4505*	WOOD FINISHING AND COATING TECHNOLOGY	3 (2+1)
FHH4506*	WOOD AND FIBER RECYCLING TECHNOLOGY	3 (2+1)
FHH4507*	TIMBER DESIGN AND ENGINEERING ANALYSIS	3 (2+1)
FHS3999A/ 3999B*	FINAL YEAR PROJECT	6 (0+6)
BBX XXXX	FOREIGN LANGUAGE ELECTIVE	3
	ELECTIVE	7
	TOTAL	34



WOOD INDUSTRY MANAGEMENT OPTION

COURSE CODE	COURSES	CREDIT
FHH3510	FOREST PRODUCT INDUSTRIAL OPERATION	3 (2+1)
FHH4501	WOOD PROCESSING QUALITY CONTROL SYSTEM	2 (1+1)
FHU4207*	INTERNATIONAL WOOD TRADE	3 (3+0)
FHU3227	INTRODUCTION TO WOOD INDUSTRY LAW	2 (2+0)
FHU4202	FOREST INDUSTRIES MANAGEMENT	2 (2+0)
MGM2111	BUSINESS AND ORGANISATION MANAGEMENT	3 (3+0)
MGM3113	ORGANISATIONAL BEHAVIOUR	3 (3+0)
MGM4183	KEUSAHAWANAN	3 (3+0)
FHS3999A / 3999B*	FINAL YEAR PROJECT	6 (0+6)
BBX XXXX	FOREIGN LANGUAGE ELECTIVE	3
	ELECTIVE	4
	TOTAL	34



UNSTRUCTURED COURSES

FHS 3901	Forest Camp	(1 credit) (2 weeks)
FHS 3902	Industrial training	(12 credits) (24 weeks)
FHS 3999A / 3999B	Final year project	(6 credits) (2 semesters)
	TOTAL	19 CREDITS



FOREST CAMP

- Students are required to undergo camping exercise during semester break, year 1
- Learning outcomes:
 - Able to define the importance of forestry sector to the community
 - Work as a team
 - Able to identify and discuss current issue on forestry
 - Able to analyse and prepare reports efficiently



FOREST CAMP

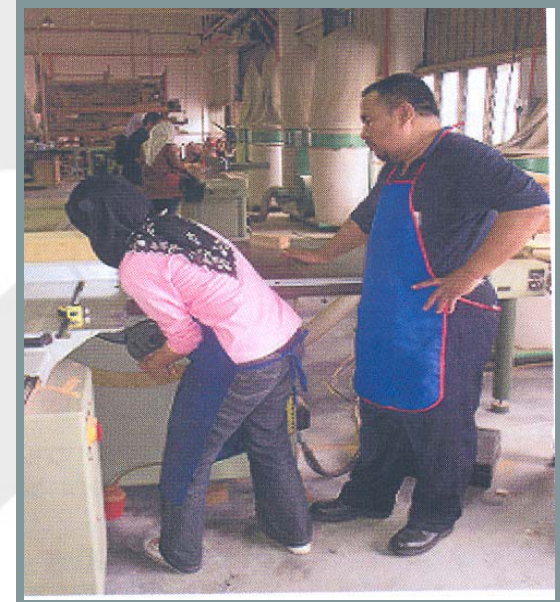


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INDUSTRIAL TRAINING

- Students will undergo industrial training in either private or public forestry agencies for 24 weeks or 6 months.
- Emphasizes are given on the resource management and planning aspects, industrial management, manufacturing and utilization of wood or lignocellulosic-based products.
- **Learning outcome:**
 1. Able to work professionally
 2. Able to identify problems in daily works and solve them systematically
 3. Analyse and present case reports efficiently.





FINAL YEAR PROJECT

- Final year students are required to conduct a research project in forestry-related field under the supervision of academic staff.
- Each student will propose a research topic or choose one from the allocated topics by the Faculty.
- The students will prepare and present a research proposal in the current semester and subsequently conduct their research.
- In the following semester, students are required to present their research findings and submit their academic report.)





UPM RELATED DEGREE PROGRAM

1. B.Sc. (Hons.) Furniture Technology
B.Sc. (Hons.) Biocomposite
Offered by Faculty of Applied Science, UiTM.
 2. Bachelor Technology (Paper and Coating)
Offered by School of Industry Technology, USM.
 3. B.Sc. (Wood Industry and Fiber Technology)
Offered by Faculty of International Forestry, UMS.
- BWST was developed to produce students with skill not only on processing technology but with skill and high knowledge in managing wood and forest product resources

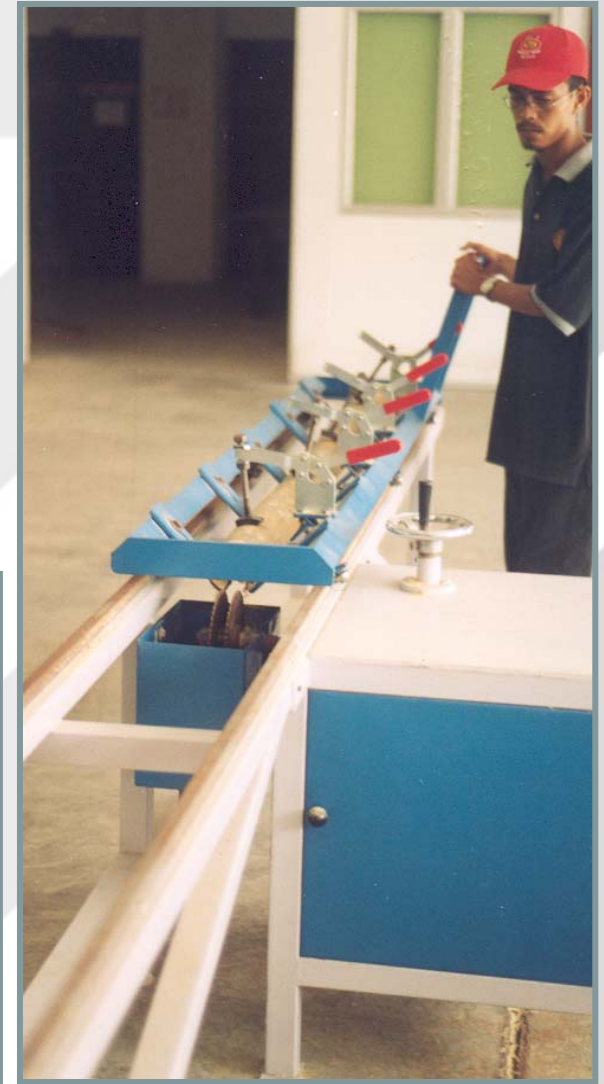


RELATED PROGRAM ABROAD

UNIVERSITY	PROGRAM
Kasetsart University, Thailand	Bachelor of Forestry (Forest Products)
Institusi Pertanian Bogor, Indonesia	Sarjana Teknologi Hasil Hutan
Universiti Gadjah Mada, Indonesia	Sarjana Teknologi Hasil Hutan
Kyoto Universiti, Japan	Bachelor of Forest and Biomaterial Science
Mississippi State University, USA	Bachelor of Wood Science and Technology
Oregon State University, USA	Bachelor of Wood Science and Engineering
Washington State University, USA	Bachelor of Science in Forest Resources
Michigan Technological University, USA	Bachelor of Wood Science
Colorado State University, USA	Bachelor of Wood Science and Technology
Virginia Polytechnic Institute and State University, USA	Bachelor of Wood Science and Forest Product
University of British Columbia, Canada	Bachelor of Wood Science



FACILITIES (WORKSHOP)



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WOOD COMPOSITE LABORATORY.



With Knowledge We Serve



WOOD DRYING LAB.



With Knowledge We Serve



WOOD CHEMISTRY LAB.



With Knowledge We Serve



WOOD DETERIORATION & CONTROL LAB



With Knowledge We Serve



WOOD ANATOMY LAB.



With Knowledge We Serve



PULP AND PAPER LAB.



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ACADEMIC STAFF

Qualification \ Post	Ph.D	M.S	B.S	Total
Professor	2		-	2
Associate Prof.	9	1	-	10
Lecturer	10	1	-	11
Tutor		2	-	2
TOTAL	21	4	-	25



CONCLUSION

- Offer at least 60 places for prospective applicants every year
- Requirements: Science based students (STPM) or Sci. Matriculations or Diploma graduates from related fields (Courses exemption).
- First enrolment of BWST – July 2006 (39 students)
- First batch graduates – May 2009
- Student centered learning (SCL) rather than TCL
- Survey and analyses on competency of graduates will be done annually after graduation
- BWST graduates are expected to fulfill the criteria required by Forestry Industries



THANK YOU AND
TERIMA KASIH

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