PEMBELAJARAN BERASASKAN HASIL (OBE)

Fakulti Sains Komputer dan

Teknologi Maklumat

Universiti Putra Malaysia

PEMBELAJARAN BERASASKAN HASIL (OBE)
FAKULTI SAINS KOMPUTER DAN TEKNOLOGI MAKLUMAT

1.0 Pengenalan

OBE ialah proses pengajaran yang memberi fokus kepada pencapaian hasil. Hasil ialah perkara yang pelajar perlu faham dan boleh melaksanakan atau kualiti yang mereka perlu bangunkan. Sekiranya hasil tidak dicapai pelajar akan diberitahu untuk memastikan ada Penambahbaikan Kualiti Berterusan (CQI) didalam sistem pengajaran.

2.0 Objektif OBE

Dengan menggunakan OBE ianya dapat:
i. Menggalakkan jangkaan yang tinggi dan pembelajaran yang lebih baik kepada semua pelajar.
ii. Mempersiapkan pelajar untuk hidup dan bekerja di abad ke 21.
iii. Menggalakkan lebih sahih bentuk taksiran (cth: pelajar menulis untuk menunjukkan mereka tahu menggunakan Bahasa Inggeris dengan baik atau menyelesaikan masalah matematik untuk menunjukkan keupayaan mereka menyelesaikan masalah)
iv. Menggalakkan membuat keputusan mengenai kurikulum dan kaedah pengajaran.

3.0 Bacelor Sains Komputer – OBE

Objektif Pembelajaran Program (programme educational objectives-PEO) yang mencerminkan ciri-ciri graduan yang ingin dihasilkan oleh fakulti ialah seperti berikut:
i. Menghasilkan graduan yang berpengetahuan tinggi dalam aspek teori dan juga praktikal dalam bidang sains komputer dan teknologi maklumat bagi memenuhi aspirasi negara, serba boleh dan berdayasaing.
ii. Menghasilkan profesional komputer yang mempunyai kemahiran komunikasi yang baik, berhemah dan beretika tinggi.
iii. Menyediakan graduan dengan pengetahuan dan kemahiran untuk penyelidikan dan pengajian lanjutan.

4.0 Program Objektif Bacelor Sains Komputer Mengikut Pengkhususan

Terdapat 4 pengkhususan Bacelor Sains Komputer yang mengikut jabatan masing-masing. Penerangan Program Objektif (PO) atau matlamat program adalah seperti berikut:

a) **Jabatan Sains Komputer**
   (Pengkhususan Sistem Komputer)
   Matlamat program ini adalah untuk:

   i.   Menghasilkan graduan yang berpengetahuan tinggi dalam aspek teori dan juga praktikal dalam bidang sistem komputer khususnya penyelesaian masalah, pengkomputeran, pengurusan dan keselamatan data yang dapat memenuhi keperluan negara.
   ii. Menghasilkan profesional komputer yang berhemah dan beretika tinggi.
   iii. Menyediakan graduan dengan pengetahuan dan kemahiran untuk penyelidikan dan pengajian lanjutan.

b) **Jabatan Multimedia**
   (Pengkhususan Multimedia)
   Matlamat program ini adalah untuk:

   i.   Menghasilkan graduan yang berpengetahuan tinggi dalam aspek teori dan praktikal dalam bidang Sains Komputer pengkhususan Multimedia bagi memenuhi aspirasi negara serta serba boleh dan berdaya saing di peringkat global.
   ii. Menghasilkan profesional komputer yang mempunyai kemahiran berkomunikasi dalam kumpulan yang baik, berhemah dan beretika tinggi.
   iii. Menyediakan graduan dengan pengetahuan dan kemahiran penyelidikan bagi tujuan inovasi dan pengajian lanjutan.

c) **Jabatan Sistem Maklumat**
   (Pengkhususan Kejuruteraan Perisian)

   Matlamat program ini adalah untuk:
   i.   menghasilkan graduan dalam bidang kejuruteraan perisian yang berpengetahuan tinggi dan menguasai aspek teori dan teknikal seperti penyelesaian masalah dalam reka bentuk dan pembangunan sistem, pengujian sistem, serta pengukuran sistem yang dapat memenuhi keperluan negara.
   ii. menghasilkan penganalisis sistem yang mempunyai kemahiran berkomunikasi dalam kumpulan yang baik, berhemah dan beretika tinggi.
   iii. menyediakan graduan dengan pengetahuan dan kemahiran penyelidikan bagi tujuan inovasi dan pengajian lanjutan.

d) **Jabatan Teknologi Komunikasi dan Rangkaian**
   (Pengkhususan Rangkaian Komputer)

   Matlamat program ini adalah untuk:
   i.   Menghasilkan graduan yang berpengetahuan tinggi dalam aspek teori dan praktikal dalam bidang Sains Komputer pengkhususan Rangkaian Komputer bagi memenuhi aspirasi negara serta serba boleh dan berdaya saing di peringkat global.
   ii. Menghasilkan profesional komputer yang mempunyai kemahiran berkomunikasi dalam kumpulan yang baik, berhemah dan beretika tinggi.
   iii. Menyediakan graduan dengan pengetahuan dan kemahiran penyelidikan bagi tujuan inovasi dan pengajian lanjutan.

5.0 Misi Universiti Putra Malaysia

Misi Universiti Putra Malaysia ialah:
Memberikan sumbangan bermakna kepada pembentukan kekayaan dan pembangunan negara serta kemajuan manusia sejagat menerusi penerokaan dan penyebaran ilmu.

6.0 Misi Fakulti Sains Komputer dan Teknologi Maklumat
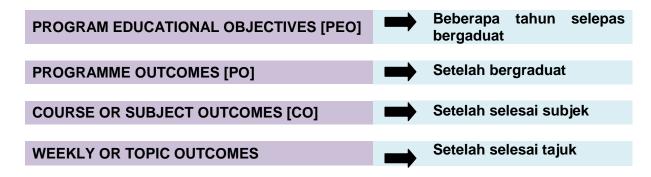
Misi Fakulti Sains Komputer dan Teknologi Maklumat ialah:
Misi Fakulti Sains Komputer dan Teknologi Maklumat adalah untuk menjadi pusat pembelajaran dan penyelidikan yang unggul dalam bidang sains komputer dan teknologi maklumat yang menyumbang kepada peradaban manusia dan pembangunan negara.

7.0 Hasil Program Bacelor Sains Komputer

Hasil Program (programme outcomes-PO) untuk program ini adalah seperti berikut:
  i. Menguasai ilmu yang cukup dalam bidang sains komputer dan teknologi maklumat.
  ii. Menguasai kemahiran teknikal sains komputer dan teknologi maklumat.
  iii. Berupaya berfikir secara kritis.
  iv. Cekap berkomunikasi dan bekerja dalam pasukan.
  v. Mempunyai akauntabiliti sosial.
  vi. Mempunyai tahap profesionalisme, nilai, sikap dan tingkahlaku beretika.
  vii. Cekap mengurus maklumat dan berkebolehan belajar sepanjang hayat.
  viii. Mempunyai kemahiran mengurus dan keusahawanan.
  ix. Mempamerkan ciri-ciri kepimpinan.

8.0 Peringkat Pelaksanaan OBE

PROGRAM EDUCATIONAL OBJECTIVES [PEO] ➡	**Beberapa tahun selepas bergraduat**
PROGRAMME OUTCOMES [PO] ➡	**Setelah bergraduat**
COURSE OR SUBJECT OUTCOMES [CO] ➡	**Setelah selesai subjek**
WEEKLY OR TOPIC OUTCOMES ➡	**Setelah selesai tajuk**

9.0 Proses Pengajaran dan Pembelajaran dalam OBE

Dokumen	Tanggungjawab
Fail Kursus	Pensyarah
Rancangan Pengajaran - Senarai topik mingguan dengan hasil pembelajaran - Kaedah pengajaran dan penilaian - Senarai tugasan/kuiz/projek dll. - Kaedah penilaian [rubric atau sebagainya] - Pembangunan Kemahiran Insaniah-pembelajaran formal/tidak formal atau berasaskan masalah	Pensyarah
Senarai pelajar	Pensyarah
Nota kursus	Pensyarah
Dokumentasi kerja kursus - Tugasan dengan penyelesaian [tugasan amali dll] - Kuiz dan ujian dengan penyelesaian - Markah kerja kursus - Kaedah penilaian individu/kumpulan [rubric atau sebagainya] - Bukti lain	Pensyarah
Soalan Peperiksaan - Saoalan dengan skema jawapan	Pensyarah
Kedatangan pelajar - senarai pelajar yang lulus - Surat amaran - Dokumen lain	Pensyarah
Analisis peperiksaan - prestasi statistik peperiksaan bagi setiap soalan - komen tentang prestasi - cadangan daripada jawatankuasa peperiksaan - *'post mortem'* of course	Pensyarah
Analisis Pencapaian Program (Jabatan)	Ketua Jabatan
Analisis Pencapaian Program Keseluruhan	Dekan/TDA

10.0 Rubric Untuk Program Bacelor Sains Komputer

PO2: Master Technical Skills of Computer Science and Information Technology

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	Related Courses
		Very Poor	Poor	Good	Very Good	Excellent	
SOFTWARE DEVELOPMENT AND MULTIMEDIA TOOLS **(MQA: Programming Fundamentals/Languages, SDLC, HCI, Graphics and Visual Computing, Intelligent Systems, Software Engineering)**							
1	**Design** Ability to design program, database, applications, AI, security, network, SAD and HCI.	Unable to construct	Able to construct but mistake on the symbol	Able to construct correctly	Able to construct correctly and use proper elements	Able to construct correctly, use proper elements and documentation	SSK3100 SSK3408 SIM3150 SSK4401 SIM3301 SKM3300
2	**Develop Program (Coding)** – using high/low programming languages Ability to - Read and make enhancement of existing code - Write and rewrite code - Use libraries/framework	Unable to construct program	Able to construct program but have logic error	Able to construct program correctly without any logic error	Able to construct program correctly without any logic error and display appropriate output	Able to construct program correctly without any logic error and display appropriate output. Adhering to programming best practice.	SSK3100 SSK3101 SSK3117

	- Debugging						
3	Construct applications using tools/programming language for a wide spectrum of computer platforms (i.e. **computer embedded, mobile, wireless, sensor)** - Able to use IDE - Able to use multimedia tools	Incomplete application and unable to use the tool	Incomplete application but be able to use the tool	Complete and able to use the tool	Complete and able to use more than 1 tool	Complete, able to use more than 1 tool and manipulate the programming component of the tool	
4	Design user interface	Unable to demonstrate ability to apply HCI design technique	Able to demonstrate ability to apply minimal HCI design technique	Able to demonstrate ability to apply acceptable HCI design technique	Complete design that meet all HCI design technique	Complete design that meets all HCI techniques and **some extra features**	

NETWORKING AND SECURITY

(MQA: Net-Centric Computing)

| 5 | Construct Network | Unable to install and configure networks and its respective components with very limited success (< 40%) | Able to install and configure networks and its respective components with limited success (40%) | Able to install and configure networks and its respective components with some success (60%) | Able to install and configure networks and its respective components with considerable success (80%) | Able to install and configure networks and its respective components with outstanding success (100%) | |

6	Network Management	Unable to manage networks and its respective components with very limited success (< 40%)	Able to manage networks and its respective components with limited success (40%)	Able to manage networks and its respective components with some success (60%)	Able to manage networks and its respective components with considerable success (80%)	Able to manage networks and its respective components with outstanding success (100%)	
7	Measure status of security/risk of computer system	Unable to identify security risk	Able to identify security risk but unable to mitigate security risks	Able to identify and mitigate security risk	Able to identify threats, vulnerabilities, security risks and mechanism to mitigate security risks	Able to identify threats, vulnerabilities, security risks and mechanism to mitigate security risks. Also able to examine professional and ethical issues involved in the use of computer technologies.	
DATABASE TECHNOLOGIES **(MQA: Information Management)**							
8	Use SQL Language	Unable to use SQL commands	Able to use basic DDL and DML commands	Able to use DDL and formulate nested queries	Able to use DDL and formulate advance queries	Able to use DDL and formulate complex queries	

9	Construct database using tools	Unable construct database	Able to construct database and create tables without specifying the integrity constraints	Able to construct database, create tables and specify the integrity and referential constraints	Able to construct database, create tables and specify the integrity and referential constraints, and populate the database manually	Able to construct database, create tables and specify the integrity and referential constraints, and populate the database using scripts	
10	Administer Database Server	Unable to manage the database correctly	Able to manage the database correctly but not using proper the commands	Able to manage the database correctly and use appropriate commands	Able to manage the database correctly and use appropriate commands, and can perform backup	Able to manage the database correctly and use appropriate commands, and can perform backup as well as recovery	

OS AND SERVER

(MQA: Architecture and Organisation, Operating Systems)

| 11 | Properly manage (i.e. install, assemble and configure) components of a computer system | Install, assemble and configure components of a computer system with very limited success (<40%) | Properly install, assemble and configure components of a computer system with limited success (40%) | Properly install, assemble and configure components of a computer system with some success (60%) | Properly install, assemble and configure components of a computer system with considerable success (80%) | Properly install, assemble and configure components of a computer system with outstanding success (100%) | SSK3207 SSK3909 (Option) SKM4999 |

	PROJECT MANAGEMENT						
12	Organise projects (commercial/non-commercial) in a form of system, hardware	Incomplete project	Partial completion of the project	Complete project and meet minimal project requirements	Complete project that meet all the project requirements and able to defend the project	Complete project that meet all the project requirements and able to justify the value and significance of the project	

PO3: Apply Critical Thinking

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
		Very Poor	Poor	Good	Very Good	Excellent
CTPS 1 KIM	The ability to identify and analyze the problem in complex and ambiguous situations, as well as the ability to assess.	Unable to identify the problem.	Enable to identify the problem.	Enable to identify and analyze problems in a less complex situation.	Enable to identify and analyze problems in complex and ambiguous situations.	Enable to identify, analyze problems in complex and ambiguous situations, and to evaluate it justification.
CTPS 2 KIM	The ability to expand and improve thinking skills such as explaining, analyzing and evaluating the discussion.	Unable to expand and improve of thinking skills, such as to restates the information provided only.	Enable to expand and improve thinking skills with the ability to explain, but could not make the analysis discussion.	Enable to expand and improve thinking skills with the ability to explain, and analyze the discussions but my able to evaluate the discussion.	Enable to expand and improve thinking skills with the ability to explain, and analyze the discussions and evaluate the minimal discussion.	Enable to expand and improve thinking skills with the ability to explain, analysis and evaluation of the overall discussion.
CTPS 3 KIM	The ability to search ideas and to find the alternative solutions.	No idea at all.	There are ideas but unable to produce a solution.	Enable produce a solution.	Enable to present some alternative solutions.	Enable to present some alternative solutions and make the best decisions of choice.

PO4: Communicate Effectively and Work in Teams

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	Related Courses
		Very Poor	Poor	Good	Very Good	Excellent	
1.	Organization of the report (written) CS1	Reader cannot understand report because of poor grammar and organization;	Reader has difficulty following report because of some abrupt jumps;	Satisfactory organization; clear introduction; main points are well stated,	Good organization; main points well stated and argued	Superb organization; main points well stated and argued, with each leading to the next point of the chapter	SIM 4300 SIM 4200 SKR3200 SKR3202
2.	Confidence in Presentation (oral) CS1	Mumbles the words, audience members in the back can't hear anything; too many filler words; distracting gestures	Low voice, occasionally inaudible; some distracting filler words and gestures; articulation mostly, but not always clear	Clear voice, proper tone and language, generally effective delivery; minimal distracting gestures	Natural, confident delivery that does not just convey the message but enhances it	Compelling, persuasive and convincing delivery	SKR3303 SKR3504 SKR4200 SKR4301 SKR4401
3.	Relating to audience CS3	Reads most of the presentation from the slides or notes with no eye contact with audience members; seems unaware of audience reactions	Occasional eye contact with audience but mostly reads the presentation; some awareness of at least a portion of the audience; only brief response to audience questions	Generally aware of the audience reactions; maintains good eye contact when speaking and when answering questions	Keeps audiece engaged throughout the presentation; modifies material on-the-fly based on audience questions and comments; keenly aware of audience reactions	Student presenter has a strong engagement with the audience and is conscious of appropriate pacing and individual and group response including during Q&A; strongly aware of audience reactions	SKR3201 SKR3306 SKR4402 SKR3302 SKR4201 SKR4202

4.	Responsiveness CS2	Reluctant to ask questions, becomes uneasy when asked questions	Asks some questions to aid understanding and learning, may become uneasy when asked questions	Asks questions relevant to understanding and learning, demonstrates poise when answering questions, but hesitates before doing so.	Ask insighful questions to help understanding and learning, demontrates poise when answering questions	Ask challenging questions to help understanding and learning, demontrates poise and confidence when answering questions	SKR4305 SKR3307 SKR4307 SKR3308 SKR4205
5.	Listening CS2	Is easily distracted	Pays attention to speaker	Demonstrates a listening attitude	Indicates signs of active listening	Actively listening with interest	SKR4206 SKR4403
6.	Using technologies for communication CS4	Selects inappropriate type of software for communicating information or is unable to use a computer to communicate or compile information	Selects appropriate type of software for communicating information but unable to apply the software to appropriately communicate information	Correctly matches types of software to communication tasks and applies individual software programs to appropriately communicate information	Integrates the results from multiple software program into a single presentation to communicate information	Integrates orderly the results from multiple software program into a single presentation to communicate complex information	SSK 4901 SKM 4310* SKM 4312 SKM 4400
		Slides seem to be cut and paste together at the last minutes; numerous mistakes; speaker not always sure what is coming next	Boring slides; no glaring mistakes but no real effort made into creating truly effective slides	Generally good set of slides; conveys the main points well	Creative slides; carefully thought out to bring out both the main points of the part of the presentation as well as the relation to the rest of the team	Very creative slides; additionally includes some convention that are not essential to the communication but add to overall quality of bringing out the main ideas	

		Uses visuals and media that are unclear in communication	Uses visuals and media that are clear in communication	Uses visuals and media to clearly enhance communication	Uses clear, colourful visuals and media to clearly enhance communication	Uses a variety of more technically advanced visuals and media to clearly enhance communication	

PO5: Reflect social accountability

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
		Very Poor	**Poor**	**Good**	**Very Good**	**Excellent**
1.	Cooperation and Teamwork TS1	Uncooperative to others (negative) Unwilling to participate in teamwork	Sometimes cooperative to others Sometimes willing to participate in teamwork	Cooperative with others Willing to participate in teamwork	Always cooperative with others Productively participate in teamwork	Proactively to cooperate with others Proactively participate in teamwork
2.	Responsibility TS2	Does not perform assigned tasks; often misses meetings and, when present, does not have anything constructive to say; relies on others to do the work	Perform assigned tasks but needs many reminder; attend meetings regularly but generally does not say anything constructive; sometimes expect others to do the work	Perform all assigned tasks; attend meetings regularly and usually participate effectively, generally reliable	Perform all assigned tasks effectively; attend meetings regularly and usually participate effectively, reliable	Perform all assigned tasks effectively; attend all meetings and proactive participation, very reliable
3.	Attitude TS3	Unable to built relationship to follow direction and rules between their peers Uses negative comments, negative body language	Able to built relationship and to follow direction and rules between certain of the members Keeps self from using negative comments, negative body language	Able to built relationship and to follow direction and rules between all the members Makes positive comments	Able to initiate work in the group Support others with comments	Able to work effectively in the group Support others with useful comments

		Give up quickly	Makes an attempt	Complete tasks	Encourage others to complete tasks	Help others to complete tasks
		Does not share time, materials, or ideas with others	Will share ideas, materials or time when giving a reward	Willingly share ideas, materials or time	Receives satisfaction from sharing with others	Seek opportunities to share with others
		Has difficulty accepting other group members	Recognizes and tolerates individual differences in group members	Recognizes, accepts and tolerates individual differences in group members	Show the value of tolerance by encouraging diversity of ideas in group members	Show the value of tolerance and acceptance by encouraging diversity of ideas in group members
4.	Effort and participation TS2	Consistently inactive in activities during the lesson	Sometimes participate in activities during the lesson	Always participate in activities during the lesson	Actively participate in activities during the lesson	Proactively participate in activities during the lesson
		No effort made to assign roles to group members	Student assigned roles but roles not consistently adhered to	Students assigned a role but roles not clearly defined	Student assigned a clearly defined role; group members perform roles effectively	All students in the class enthusiatically participate Each students accepted the roles; group members are commited to the roles

PO6: Posses High Level of Professionalism, Values, Attitudes and Ethics

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
		Very Poor	Poor	Good	Very Good	Excellent
1.	Professional practice	Unable to state, explain or demonstrate	Able to state the impacts of being ethical and unethical to professional practice	Able to give simple explanation on the impacts of being ethical and unethical to professional practice	Able to elaborate the impacts of being ethical and unethical to professional practice	Able to demonstrate the impacts of being ethical and unethical to professional practice
2.	Ethical behavior	Unable to state, explain or demonstrate	Able to state an ethical and unethical behavior in the organization	Able to give simple explanation to the ethical and unethical behavior in the organization	Able to propose specific explanation to the ethical and unethical behavior in the organization	Able to demonstrate and act with social responsibility to the ethical and unethical behavior in the organization
3.	Determining decision	Unable to propose	Does not correctly propose what must be decided or does not find out who should be involved in the decision making	Propose what must be decided. Find out who should be involved in the decision making process	Select what must be decided. Determines who should be involved in the decision making process for that case and accurately identifies all of the interest	Select who should be involved in the decision making process for that case and accurately identifies and able to justify the selection

4.	Decision making	Unable to decide	Has difficulty selecting decisions	Able to select relevant decisions	Able to select relevant decisions with minimal justification	Able to select relevant decisions with analytical justification

PO7: Manage Information Effectively and Apply Life Long Learning

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
		Very Poor	**Poor**	**Good**	**Very Good**	**Excellent**
1.	The ability to research and gather information*	Collects no information or collects irrelevant information	Collects little information with little relevance	Collects some relevant information from various sources	Collects a great deal of relevant information from various sources	Collects more than a great deal of relevant information from various sources
2.	Independent learning	Requires step-by-step instructions to complete a task	Requires guidance to complete a task	Able to perform the given task independently but partially completes what is required	Able to perform the given task independently and completes only what is required	Able to perform the given task independently and goes beyond what is required

PO8: Posses Managerial and Entrepreneurial Skills

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	Related Courses
		Very Poor	Poor	Good	Very Good	Excellent	
KK1 KIM	An ability to identify opportunities for IT businesses.	Unable to identify IT businesses opportunities that can be identified by other students.	Enable to identify the good opportunity of IT business only.	Enable to identify some good opportunity of IT.	Enable to identify and organize the IT opportunities for a potential priority with its justification.	Enable to identify opportunities for unique IT businesses and potential.	SIM4208 SIM3150 SKM3300
KK2 KIT	The ability to produce IT business planning.	Unable to create IT business planning content.	Enable to produce the content of IT business planning specifically.	Enable to produce content designated IT business planning.	Enable to produce the content of IT business planning with very potentially.	Enable to produce the content of IT business planning as specified with viability impact.	MGM3180 dan Kursus baharu

PO9: Exhibit Leadership Skills

NO	CRITERIA	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	Related Courses
		Very Poor	Poor	Good	Very Good	Excellent	
LS1 KIM	Knowledge of basic theories of leadership and has leadership qualities.	Unable to show leadership qualities.	Enable to show at least one leadership.	Enable to show half of the leadership characteristics identified.	Enable to show the characteristics of the maximum leadership in some situations.	Enable to show the characteristics of the maximum leadership in all situations.	SKM4400 SIM4207 SIM4300 SIM4350 SIM4351 SSK4617 SKR3504 SKR4301 Latihan Industri
LS2 KIM	Ability to lead projects.	Unable to lead any project.	Enable lead the project with full guidance.	Enable lead projects with minimal guidance.	Enable lead the project without guidance.	Enable lead and complete the project without the guidance within the stipulated time.	