

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
«IGOR SIKORSKY KYIV POLITECHNIC INSTITUTE»**

PROJECT MANAGEMENT

METHODICAL GUIDELINES

to the preparation and defense of the course work

KYIV 2017

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for master level students of specialty 073 «Management»
Specialization «International Business Management»

*Recommended by the Academic Council
Of Igor Sikorsky Kyiv Polytechnic Institute
management and marketing department*

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Educational edition

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For master level students of specialty 073 «Management» specialization «International Business Management»

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1. GENERAL INFORMATION

«Project management» discipline is for master level students of specialty 073 «Management» specialization «International Business Management».

The relevance of the course is caused by the fact that nowadays society faces a rapid development and globalization and integration processes, high degree of uncertainty, transition of the global economy to the knowledge economy. So far only the harmonious use of strategic management and project management instruments can ensure the sustainable development of the socio-economic system of any level (enterprise, region, and country).

Due to educational program «Project management» discipline includes writing the course work that contributes to depth knowledge of it, further systematization, expansion and consolidation of acquired knowledge. The work covers a number of key sections of the course and allows the student to reveal the creativity in a comprehensive approach to solving problems.

Course work is a comprehensive research of specific project management using modern project management methodology and Microsoft Project software program.

The purpose of the course work is formation of modern management thinking and systems of specific knowledge in the field of project management in future managers, and acquisition of skills of taking administrative decisions regarding the advisability of investments, analysis and proper project evaluation conducted in enterprises, ability to generalize not only positive management experience, but also to recognize weaknesses, negative developments in project management.

2. REQUIREMENTS TO THE COURSE WORK PREPARATION

Working on coursework, student must learn skills of correct problem formulation and justification of its relevance, formulation of purpose and objectives of the study, construction of a logical plan and optimal structure of the course work, work with literary sources and statistics, analysis and evaluation of various aspects of the selected project, grounding of own summaries, conclusions and suggestions.

The theme of the course work. Themes of coursework are offered and approved by Department. Students choose their own theme of course work, but under the proposed ones (see Appendix A). Project can be the one of the ways of the course work preparation. Student must put forward a proposal for its own theme of course work, but in case of its feasibility justification. Student must submit within the course work:

- comprehensive plan of course work;
- formulation of purpose and objectives of work;
- theoretical part;
- practical (calculation) part;
- conclusions;
- list of literature on research.

Introduction. The volume of introduction is set in the range of 1-2 pages, which provides justification of relevance and practical significance of the chosen theme; key characteristics of the studying project are identified, purpose, objectives, object and subject of study are formulated; applied methods of study are listed; practical significance of the results are mentioned, base of study and description of the main sources of information (literature, statistics, official, reference, scientific) are pointed.

Main part. The essence of theme is revealed by studying existing domestic, foreign scientific and special literature, and also by studying legal and normative base in the theoretical part of work. Economic essence of studying problem is set, different approaches to solving are considered and evaluated, own point of view is given and justified. This section should contain 2-3 units of no less than 15 pages.

In practical (second) part student develops project on materials of a particular company and justify its feasibility using Microsoft Project software environment. Results of analysis are illustrated with tables, graphs, diagrams with appropriate proposals.

The volume of this section is 20-25 pages.

Conclusions. Conclusions should include a brief description of the results of the theoretical and practical study, containing a summary of made assessments and generalizations during the project studying according to author objectives and suggestions. Studying the conclusions text should make the reader known about degree of realization of set purpose and objectives of course work.

Such structure of work is suggested.

Introduction

Chapter1. (Theoretical part of the course work) *TITLE*

- 1.1. (concept and essence)
- 1.2. (content, functions, types, classification, explanation)
- 1.3. (problematic and its solutions)

Chapter 2. (Practical part of the course work) *TITLE*

- 2.1. General characteristics of the company and proposed project.
- 2.2. Production-organizational project plan.
- 2.3. Time, project cost and resources management.
- 2.4. Evaluation of the project.

2.5. Project Risk Analysis

Conclusions

List of references

Appendices

3. PROCEDURE FOR THE COURSE WORK PREPARATION

Course work should consist of theoretical research and its practical use. Themes of coursework cover all issues of project management that help students to systematize received knowledge and use it in the project design and analysis.

The process of the course work involves the following steps:

- 1) choosing direction, object and the subject of scientific research, themes of the course work;
- 2) choosing company, on base of which course work will be done;
- 3) search and study of relevant literature and practical material;
- 4) making plan according to course work theme;
- 5) research, making relevant calculations;
- 6) writing conclusions according to made calculations;
- 7) preparation of the course work;
- 8) defense of the course work.

1. Choosing of direction, object and the subject of scientific research, themes of the course work.

At the first step student chooses direction, object and subject of the study. *The object of study* is a set of relationships, processes and phenomena, correlations of different aspects of the theory and practice of science that serves as a source of essential information, raises the problem situation and is chosen for study. *The subject of study* – those essential relationships that should be studied in certain work, are the main determinants for a particular study, contained within the object.

2. Choosing of company on base of which course work will be done.

At the second step students choose company, on base of which course work will be done. Study of conditions of operation and features of project management by domestic enterprises will promote the integration of theoretical knowledge with practical skills to solve issues in enterprise activity.

3. Search and study of relevant literature and practical material.

Search and study of relevant literature and practical material is connected with use of the catalogs of scientific and technical information department of NTUU «KPI» library etc. Indicators that student uses in practical part and the

description of the proposed project are practical material for writing the course work.

4. Making plan according to the theme of the course work.

Making plan is the step of the course work that covers the major issues in a clear logical sequence. The plan actually acts as a basis of the study, indicates the direction of the purpose.

Studying selected materials and systematizing literature student analyzes research and provides a solution to a given problem.

5. Research, calculations. The fifth step of the course work provides theoretical research, practical experiments. The purpose of theoretical research is definition in the synthesis of knowledge in project management, explanation and summarization of the results of empirical research, identification of common patterns. This work is mainly with literary sources, their critical analysis and synthesis. The concept of practical experiment includes scientific experiments and observation of the phenomenon. Specifically, it should be a characteristic of the object of study - a real company and justification of the proposed project.

6. Writing conclusions according to made calculations

As a result of theoretical study and its practical implementation it is necessary to conduct a general analysis of the results (separately for theoretical and practical part) and submit it in the form of conclusions.

7. Preparation of the course work

Coursework is prepared in accordance with the requirements set out in section 5.

8. Defense of the course work

This is the final step of the course work that culminates by evaluating the student by score for its writing. For more details see section 6.

Manager of the course work gives each student a timetable for its preparation. During the semester teacher makes appropriate notes on completion of steps mentioned above (see Annex B)

4. METHODOICAL GUIDELINESS TO THE PREPARATION OF THE COURSE WORK

4.1. Theoretical part of the course work

Theoretical principles of project management are covered in the theoretical part of the course work. Results of literary and analytical study of the chosen theme, views on solution of the problems of foreign and domestic scientists are given in this part of the course work, and also own opinion on the issue (according to the chosen theme) is expressed.

The following structure of theoretical part of the course work by themes is proposed.

THEME 1. Project management in system of management of organizations

Section 1. Theoretical aspects of project management basics

1. The concept of the project, its main characteristics
2. Model of project management
3. The experience of the world developed countries in the formation of uniform standards and methodological approaches to the project activity.

THEME 2. Project integration management

Section 2. Theoretical aspects of project integration management

1. The essence of project integration management
2. Processes of project integration management
3. General change management.

THEME 3. Justification of the project feasibility

Section 1. Theoretical aspects of project effectiveness evaluation

1. The concept of project effectiveness, basic principles of the effectiveness evaluation
2. Methods of investment projects effectiveness evaluation
3. Problems of the projects effectiveness evaluation

THEME 4. Project organizational support

Section 1. Theoretical aspects of the project's organizational structure

1. The term "project management organizational structure" and the principles of its formation
2. Types of organizational structures in project management
3. Design of the project office

THEME 5. Project content management

Section 1. Theoretical aspects of the project content management

1. The essence of processes of project content management
2. Structurization of project, its components
3. Methods and instruments of the project content management

THEME 6. Project terms management

Section 1. Theoretical aspects of time management in the project realization

1. The essential characteristics, values of net and calendar scheduling
2. Theoretical and methodological basis of development of net schedule
3. Current trends of time management in the project realization

THEME 7. Project cost management

Section 1. Theoretical aspects of project cost management

1. The essence of the project cost management, components of processes of the project cost management
2. Methods of the project operations cost evaluation
3. Project budgeting

THEME 8. Project realization control

Section 1. Theoretical aspects of project controlling

1. The essence of the project controlling process
2. Instruments of project schedule control
3. Method of the earned value and technologies of the project forecasting

THEME 9. Project quality management

Section 1. Theoretical aspects of the project quality management

1. The term "quality", its importance for the success of the project
2. Methods and instruments of quality management
3. Basic approaches to quality management

THEME 10. Human resources management

Section 1. Theoretical aspects of human resources of projects

1. Main characteristics of the project team: composition, structure, group processes
2. Methods of project human resource management
3. Approaches to recruitment and development of the project team

THEME 11. Project communications management

Section 1. Theoretical aspects of the use of communication as a means of project management

1. The concept of communication in project management
2. Methods and instruments of project communication organization
3. Approaches to planning project communication

THEME 12. Project risk management

Section 1. Theoretical aspects of project risk management

1. The essence of «project risks», "uncertainty" concepts
2. Methods and instruments of the project risks identifying
3. Approaches to the project risks cost evaluation and responding to project risk

THEME 13. Project supply management

Section 1. Theoretical aspects of project supply management

1. The essence of supply planning, the structure of the project management plan
2. Approaches to supply and contracts planning
3. The procedure and documentary support of tender

THEME 14. Project implementation management

Section 1. Theoretical aspects of management of the project implementation process

1. The essence of project implementation and analysis processes
2. Methods and instruments of project implementation analysis
3. Approaches to project implementation management

THEME 15. Project closure management

Section 1. Theoretical aspects of managing the project closure process

1. The nature of the project closure processes
2. The main stages and documentary support of the project closure
3. Problems in project management at closing phase of the project and their solutions

THEME 16. Project programs and portfolio management

Section 1. Theoretical aspects of project programs and portfolio management

1. The essence of "multi project", "project portfolio «concepts
2. Mechanisms of distribution of resources in multi project management
3. Approaches to multi project management

THEME 17. Project financing

Section 1. Theoretical aspects of project financing organization

1. Content of project financing, its types and principles
2. Organization of project financing
3. Current state and prospects of project financing development

THEME 18. Corporate project management system

Section 1. Theoretical aspects of creation of the corporate project management system

1. The essence of corporate project management system, its main elements
2. The main roles in the corporate project management system and their competence
3. Approaches to creation of the corporate project management system

THEME 19. Project information support management

Section 1. Theoretical aspects of software support of project management process

1. The essence of information technologies of project management
2. Implementation of the project management system at the enterprise
3. Comparative analysis of software support for project management

THEME 20. Fundraising and designing

Section 1. Theoretical aspects of the project fundraising.

1. The essence of fundraising, its main types
2. Fundraising technologies
3. Tendencies of fundraising development in Ukraine and abroad

This list of course work themes is approximate. Students may propose their own themes of work previously confirmed by their lecturer.

4.2. Practical part of the course work

Student develops a specific project on particular company materials in second part of the course work.

Let consider recommendations on doing the calculation part by the structural units:

2.1. General characteristics of the company and the proposed project

It is recommended to characterize the enterprise according to the following data:

- *Activity* (economy sector, goal (justification of existence), basic functions (products and services), rating scale (international, state, local), complexity and research intensity of technologies, goods and services).
- *Property* (capital (private, state, cooperative), legal form).
- *Influence* (main owners, control center, the role of government).
- *Location* (location of organization, distance from the consumer, transport and communications).

It is advisable to define the project by the following components:

1. Analysis of the problem situation.
 2. Development of the concept of innovative project, which should include:
- The reasons for initialization of the project (defining the problem to be solved by means of product of the project and reason for setting up the

project at organization). Detail the problem, which is expected to be solved by the project.

- The essence of the proposed innovative idea and the way to use it to solve a particular problem of organization. Describe the way of functioning of project product to solve the problem of organization from the standpoint of its development strategy. Project title should be concise (no more than 12 words).
- Project goal. State the purpose of the project, pointing out future product of the project, time and financial constraints. Determine the start date of the project, calendar schedule. Directive term of project is taken by $T_{dir} = T + 4$.
- Project expected benefits. Clarify the list of stakeholders of the innovation project and their interests based on development strategy
- Project restrictions. Evaluate the general expenses and revenues from the project. Distribute them in time. Evaluate the possible start and duration of the project from the standpoint of development strategy
- Project assumptions and risks. Identify the major internal and external risks that may arise during project implementation and impact (both negative and positive) for the implementation and achievement of project objectives.

3. Market research of:

- completeness and complexity of marketing activities on the project;
- development level and attractiveness of project products;
- reputation of the company and products;
- correctness of the choice of pricing policy;
- plan of product promotion on the market;
- effectiveness of relationship of seller and buyer, organization of the work with consumers of project products (especially permanent);
- organization of sale of products;
- description of project sales market and its possible reaction on products of the project;
- used methods of forecasting demand; potential competition from substitute products;
- influence organization on the market for project products adaptation;
- Main success factors of project products (quality, sales organization, ability to develop new products, company reputation, advertising, production costs, product price, financial stability of the enterprise).

4. Project life cycle with division on the main stages.

Based on project initiative, student identifies life cycle of the innovation project, its phases, and stages of life cycle. The result is entered in the table 1.

Table 1. The content of the project life cycle phases

Phase	Initiation	Planning	Implementation and control	Closure
The beginning of phase				
The end of phase				
List of main works				
Key milestones				
Difficulties				

5. Project participants. This list should include not only those participants who are directly involved in the project (customer, sponsor, investor, contractor, etc.), but also external participants (the licensor, the creditor etc.).

When participants of the project are determined, the table with the status of their participation in the project based on the developed life cycle is formed (internal - external, role in the project and so on.) (Table 2).

Hourly wage (UAH / hour) is determined for the main project participants.

6. Project Description - a list of major works necessary to get the project product. The level of details is determined by the specifics of the project; however, the number of work packages should be not less than ten.

Student develops the basic structural elements of the project. It is recommended to start with the clarifying the objectives and development of the hierarchical structure of works distribution (WBS).

Table 2. Project participants

№	Stages of the project implementation	Project participants				
		Customer	Sponsor	Investor	Contractor	...
1	Concept development					
2	Evaluation of vital activity					
3	Project planning					
4	Basic designing					
5	Signing of the contracts					
6	Supply					
...						
N	Output of the project					

The basis of WBS decomposition can serve:

- components of a product (object, services, activities) realized in project;
- process or functional elements of organization activity that implements the project;
- stages of the project life cycle, main phases;
- units of organizational structure;
- geographical location for spatially distributed projects.

The hierarchical structure of works distribution WBS is formed as a graph with decomposition no less than the third level.

Then organizational structure of performers is based on the analysis of project participants (OBS).

The next step is linking of work packages (WBS) with the implementing organizations (OBS) based on construction of a matrix of responsibility. The number of types of responsibility in the matrix may vary depending on the specifics of project and its organization. In addition, roles of people not directly involved in the project, but those who can provide support in the teamwork, can be displayed in the matrix. It is recommended to limit small set of easy to describe and understand types of participation. For example, the most important role in any detailed work play directly those who are responsible for its implementation, but people or organizations that provide support, as well as those who carry out the evaluation and acceptance of works, have to be displayed in the matrix. There are such types of participation in the project: RE - responsible executive, P - performer, AW - acceptance of works, CW - coordination of works, C - control, A - approval etc.

The first point of calculation part is completed by summarizing table (see table 3)

Table 3. Characteristics and parameters of innovation project works

WBS	Work title	Duration of work, days	Previous work	Resources, pers. per day
	<i>Start of the project</i>			
	...			
	<i>Closure of the project</i>			

2.2. Industrial-organizational project plan.

The plan is composed by the components:

- location of the entity, transportation routes, availability of communications;
- production areas, equipment, production technologies, their progressiveness, need of acquisition of foreign patents, licenses, know-how, etc.;
- security of production with main resources (raw materials, materials, energy resources), suppliers of raw materials and materials and working relationships with them;

- import component of the project (need of acquisition of raw materials, materials, equipment, etc. abroad, and list of the main contractors for acquisition of imported products);
- environmentally friendly production and safety of workers;
- staffing and the level of staff qualification;
- organizational management scheme;
- production volumes;
- salaries and other personnel costs;
- the cost of raw materials;
- current production costs.

It is advisable to determine the need of workforce (position, number of employees, employee salary with charge), personnel and administrative responsibilities of the company, and qualification requirements to workers: position, education, quality, and experience of work.

2.3. Time cost and resources management of the project

Innovative project organization management provides:

- creation of model of innovative project in MS Project;
- creation of motivation for performers;
- determination of criteria for taking decision concerning project leaving and minimizing losses.

Student using MS Project software system creates a model of its own project.

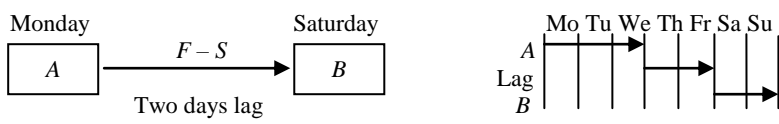
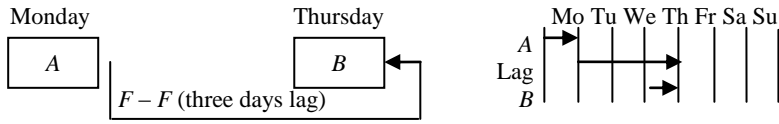
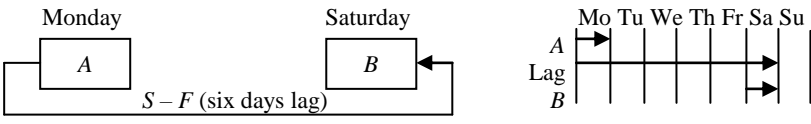
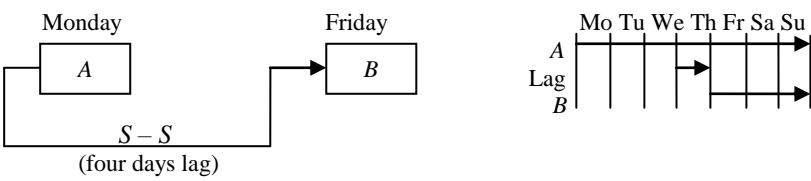
Each transaction (package) needs resources and cost. List of works links should include not only simple "Finish" – "Start ", but also complex ones - "Start - Start», «Hammock", etc. MS Project uses four types of dependencies between works, characteristics of which are described in table 4.

Stages of project development in Microsoft Project:

1. Developing and calculation of parameters of the network diagram.

Step 1. Determination of the list and sequence of works. You can get list of works from the working structure of the project, but the WBS does not show in which order specified works should be done. Therefore, the logical connections between them should be established by the student (Table 3).

Table 4. Types of connections of works of the project

Type of connection	Content of connection	Examples of works with this type of connection
Finish to start (FS)	A FS B = Work B cannot start before work A ends	(Groundwork set) FS (Wall construction) 
Finish to finish (FF)	A FF B = Work B cannot end before work A ends	(Completion of a book) FF (Writing the final chapter) 
Start to finish (SF)	A SF B = Work B cannot end before work A starts	(Installation of new furniture has begun) SF (Moving of old furniture has finished) 
Start to start (SS)	A SS B = Work B cannot start before work A starts	(Work on the development of the project concept has begun) SS (Project management has begun) 

Step 2. Graphic formation of the network diagram.

Early start <i>ES</i>	Work duration <i>t</i>	Early finish <i>EF</i>
Code and work title		
Late start <i>LS</i>	Time fund <i>F</i>	Late finish <i>LF</i>

Fig. 1. The placement of grid network diagram ("key")

The result of the second step is network diagram with definition of works and logical connections between them.

Step 3. Definition of duration of work. For the course work in order to master the skills in evaluating project works duration the most appropriate is the method of possible ratings. Using this method work duration is evaluated as average expected value t_{ex} from three evaluations provided by responsible work executor or another competent person:

- optimistic t_{min} , which corresponds to the duration of the work in case of the most favorable set of circumstances;
- most likely evaluation t_{ml} ;
- pessimistic t_{max} , which corresponds to the duration of the work in case of the most unfavorable set of circumstances.

These evaluations are made in any time units selected for evaluation of project time parameters (hours, days, weeks, and months). Next, the average expected value is calculated by the formula:

$$t_{ex} = \frac{t_{min} + 4t_{ml} + t_{max}}{6}.$$

To determine the possible fluctuations or variability of these values quadratic average is used:

$$\sigma_i = \sqrt{\frac{(t_{max} - t_{min})^2}{6}}.$$

To simplify the calculations, which are allowed in the laboratory work, you can use the formula for the two evaluations, according to the average expected value:

$$t_{ex} = \frac{3t_{min} + 2t_{max}}{5},$$

and quadratic average:

$$\sigma_i = \sqrt{\frac{(t_{max} - t_{min})^2}{5}}$$

The greater the difference between optimistic and pessimistic time, the bigger σ , or the degree of uncertainty in evaluating work duration. These calculations are based on the assumption that uncertainty of time for works can be obtained by the β -probability distribution. Thus, it is advisable to use average expected duration of works for construction of the project model if optimistic and pessimistic evaluations of works duration are known.

Since works of the critical path determine the overall duration of the project, the variability of these works will affect the variability of time performance of the project in whole. Other works have reserve of time, so their

fluctuations do not affect the overall duration. If you set the duration of the project in whole as T , then

$$T = \sum t_{icc};$$

$$\sigma_{cr} = \sqrt{\sum \sigma_{icr}^2}.$$

The assumption is that the distribution of time of the project closure is normal.

Step 4. Determination of early start and finish of the project works by "direct passing".

Path - a sequence of related works from start to finish of the project

Early Start (ES) — the earliest possible start of the work.

Early Finish (EF) — the earliest possible finish of the work.

These parameters are calculated by the following formulas:

$$EF_i = ES_i + t_i;$$

$$ES_{i+1} = EF_i,$$

where EF_i — early finish of work i ;

ES_i — early start of work i ;

t_i — duration of work i ;

ES_{i+1} — early start of work $i + 1$.

Rule: while calculating early terms if some work starts after several previous ones, early start of this work is determined taking into consideration the latest of early finishes of previous works.

This step makes it possible to determine the duration of the whole project. Project duration is defined as the largest value of early finishes of the remaining works.

There is always the start date of the project; for each operation there is the earliest start date (ES). All operations of the project, which will start on the day of project have $ES = 0$ (Fig.10). When operation starts later than "0", then time delay is specified. For example: operation starts in 6 days later, then $ES = 0 + 6 = 6$. Enter «6» to cell of early start.

Step 5. Determination of the late terms of start and finish of works by "reverse passing".

This step involves the calculation of specified parameters in reverse order - from the last to the first work of project.

Late Start (LS) — the latest possible term of start of the work, after which a delay will affect the term of the whole project closure.

Late Finish (LF) — the latest possible term of finish of the work.

These terms are calculated by the following formulas:

$$LS_i = LF_i - t_i ;$$

$$LF_{i-1} = LS_i .$$

Rule: if there are two parallel after some work, the late finish of this work is determined by considering the earliest start of the late starts of the following works.

Step 6. Determination of the critical path and float on works.

Works are critical if their early and late terms of start and finish are the same.

Works are uncritical if their early and late terms of start and finish are not the same.

Critical Path is formed by the sequence of critical works. This is the longest of all of the project paths which shows the least time needed for complete implement of all project works.

Float (F) — is the maximum time, determining delay of start of uncritical work, which does not affect the duration of the whole project implementation. It is calculated by formulas:

$$F_i = LS_i - ES_i$$

or

$$F_i = LF_i - EF_i.$$

Remind that full reserve - is the maximum time interval to which you can delay the operation to the date of its early start without disruption of project finish date. Management content of temporary reserve is to resolve technological, resource or financial constraints of the project if it is necessary. It allows managers to delay the operation at this time without affecting the overall project duration and duration of directly related operations. Works that are on the critical path have float equal to zero

You cannot finish the project faster than in time required for passing critical path. Therefore, the critical path is used for planning the basic supplies during the project. In addition, any delay in one of the operations occurred on the critical path will surely delay the whole project and, therefore, these operations require special attention during the project.

Thus, the critical path method allows to calculate possible schedule of execution of complex of operations on the basis of this logical network structure and evaluations of each work duration, and to define the critical path of the project. This methodology is particularly important in technology transfer projects. That is why; knowing which operations have full float the project manager can more flexibly use project resources and reduce risks.

2. Modeling of project works in Microsoft Project.

– Import the list of works in Microsoft Project. Evaluate the structure and parameters of the project works

– Link works, build a model of project - Gantt diagram (Fig.2), a network diagram in Microsoft Project.

In fact, the Gantt chart is composed of bands oriented along the time axis (Fig.2). Each band in the diagram corresponds to a particular task as part of the project (type of work), its ends – points of start and finish of the work, its length – work duration. Vertical axis of the diagram is a list of tasks. In addition, you can mark the total tasks, completion percentage, indexes of sequences of depending works, key point marks (milestones), and current time mark. Links between the operations on Gantt diagrams are displayed with links FS, SS, SF, FF.

3. Analysis of the proposed network diagram [21] is done as follows:

- topology of the network diagram is checked, feasibility of each work selection, sequence of work and connections between them, possibility of raising the parallel execution of individual works;
- intensity of network diagram is calculated;
- probability of innovative project closure in defined term is calculated.

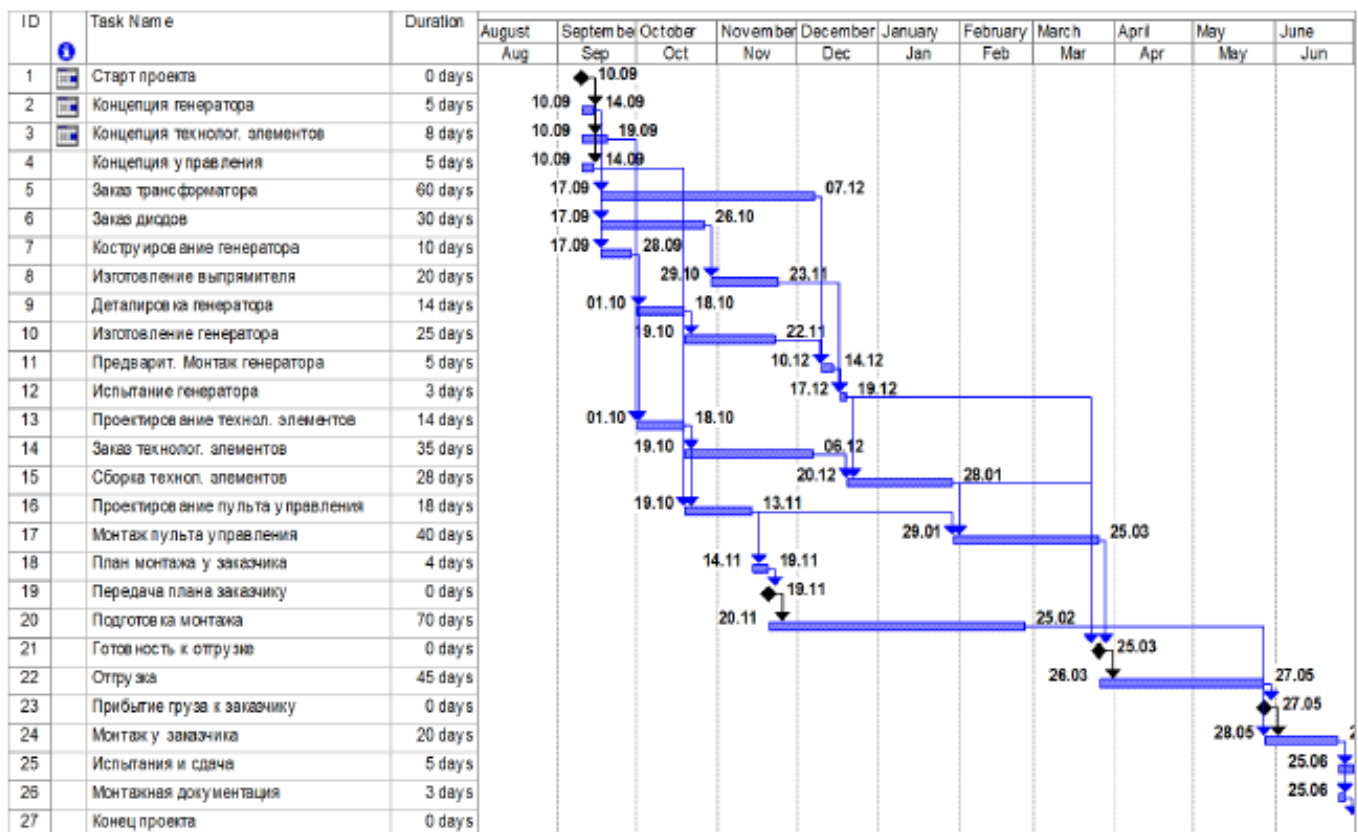


Рис. 7. Диаграмма Ганта

Fig. 2. Gantt diagram

To calculate the intensity of network diagram first of all you should calculate coefficients of intensity of the works according to the following formula:

$$k_{ii} = \frac{t[L_{\max}] - t^1[L_{cr}]}{t[L_{cr}] - t^1[L_{cr}]},$$

where $t[L_{\max}]$ – maximum length of the path, which passes through this work;

$t^1[L_{cr}]$ – part of the maximum path $t[L_{\max}]$, which coincides with the critical path, except duration of work i , which is considered;

$t[L_{cr}]$ – duration of the critical path.

Then works are distributed according to the coefficients of intensity in zones by intervals:

- critical zone: $1 \geq k_{ii} > 0,95$;
- subcritical zone: $0,95 \geq k_{ii} > 0,8$;
- reserve zone: $0,8 \geq k_{ii}$.

Then specific weight of each zone is determined - critical $C(\%)$, subcritical $S(\%)$, reserve $R(\%)$ – by the formulas:

$$C(\%) = \frac{C}{C + S + R},$$

$$S(\%) = \frac{S}{C + S + R},$$

$$R(\%) = \frac{R}{C + S + R},$$

where C, S, R – respectively the number of works in the critical, subcritical and reserve zones. Based on the calculated coefficients student can find coefficient of intensity of all network diagram by the formula:

$$K_{Ycc}(\%) = C(\%) + 0,5S(\%).$$

Coefficient of intensity of network diagram should be within 15-25%. If the coefficient is more, it indicates about congestion of the project and complexity of its practical implementation in defined terms.

Considering that distribution of time of project completion is normal, and having this distribution, we can calculate the probability of project finish in defined term T_{dir} by the formula:

$$P = F(X) = F\left(\frac{T_{dir} - T}{\sigma_{cr}}\right),$$

where $F(X)$ – Laplace function value for the normal probability distribution;

T_{dir} – directive term of the fulfillment of the all project works;

X – argument of Laplace function:

$$X = \frac{T_{dir} - T}{\sigma_{cr}}$$

P values are in Laplace function table (see Annex D). The probability of project closure in the defined term must be within $0,35 < P < 0,65$. If $P < 0,35$, there is a considerable risk of disruption of the calculated term of the project, so you need to reconstruct network diagram and recalculate its parameters. If $P > 0,65$, it indicates that there is a small number of works in critical and subcritical zones, there are significant reserves. In this case it is also necessary to review network diagram and reduce the duration of work.

4. Planning of project resources in Microsoft Project.

- Describe the parameters of project resources. Assign resources to certain works of project.
- Analyze obtained histogram of downloaded resources. Make a conclusion on the feasibility of its alignment
- If it is required to optimize project due to the inadequate intensity of network diagram (overload of available resources) or due to probability of the project closure in defined term, carry out alignment of loading of project resources manually.

If student wants to shorten project terms, he should strive to reduce the time of the critical path.

MS Project allows to level loading of resources automatically and manually.

In automatic leveling of loading MS Project chooses works, which should be delayed or interrupted, taking into account such factors as identification of work, available time reserve, priority of work, dependences of work, planned date, and restrictions of work. When MS Project levels loadings of resources, resource assignments remain unchanged. It only delays or interrupts works.

Leveling of loading manually, you should analyze the same factors, and then correct parameters of work or recourse to avoid overloading. For example, you can delay work, interrupt it or assign it additional resources.

5. Analysis of network diagram after optimization: calculate coefficient of intensity of network diagram and probability of project closure in defined terms after optimization.

6. Identification of project labor costs in Microsoft Project.

Labor costs - expenses on compensation of people involved in the project, including designers, suppliers, etc. The cost in cash is calculated by multiplying the number of man-hours to the cost of one man-hour for each labor resource.

Result of this point of course work is Gantt diagram - works; Gantt diagram - resources and project reports, including: review project reports, reports on the

appointment and loading of works and recourses, report on expenses on manpower.

2.4. Evaluating of the effectiveness of the proposed project

The effectiveness of the project is a category that reflects compliance of the project to the purposes and interests of its participants.

To calculate key indicators of the effectiveness of the project it is advisable to make a table (see tabl.5).

It is preferably to distribute expenses of the entire project implementation equally between stages.

Distribution by articles of each stage includes:

- "Expenses on compensation» - no more than 53% from the total amount of expenses.
 - "Social security contributions" - no more than 36.4% from the total amount of expenses on compensation.
 - "Materials" - no more than 30% from stage costs.
 - "Fuel and energy for scientific and industrial purposes" - filled in case if that it is necessary to spend significant amounts of fuel and energy for the project.
 - "Business trip expenses" - should be reasonable and not exceed 10% of the total amount of project expenses.
 - "The cost of works fulfilled by other organizations and enterprises" - no more than 40% total amount of expenses on stage.
- If it is necessary to involve subcontractors, justification of expediency of their participation in development is provided with information on specialization, experience, technical equipment, etc.).
- "Special equipment" - no more than 30% from the stage costs.
- If it is necessary to purchase special equipment student should provide appropriate justification. "Special equipment for scientific (experimental) works" includes machines, devices, tools, instruments, stands, vehicles, mechanisms, other special equipment needed for R & D.
- "Other expenses" - this article includes costs for Internet information services, office equipment repair, approval of normative and technical documentation, expert services, protection of intellectual property, publication of works on materials of study, etc.
 - "Overhead costs" - it is recommended no more than 30% from expenses on compensation.

Table 5. Output data for calculation of key indicators of the project effectiveness

Indicators	Value
1. Project cost (project expenses), including	
Free Cash Flow	
EBITDA (= Revenue - variable costs - fixed costs)	
Profitability of EBITDA,%	
2. life cycle, years	
3. Income (except tax) from the project at the end of life cycle, UAH	
4 Cash flows by years, UAH:	
1 year	
2 year	
...	
n year	
5. Discount rate,%	
7. Acceptable for enterprise investment payback period, years	

If there are no expenditures on individual articles, then put "-" in corresponding column (Table 6).

Table 6. Costs of the project

Stage of works	Wages	Contributions	Materials and components	Fuel and energy for scientific and production purposes	Business trip expenses	Special equipment for scientific (experimental) work	The cost of work performed by outside organizations	Other costs	Overhead costs	Total
1	2	3	4	5	6	7	8	9	10	11
1										
...										
n										

Criteria of project efficiency are used in practice in order to take decision on the feasibility of financing, they are following: net present value (NPV), profitability index (PI), discounted rate of return on investment (DROI), internal rate of return (IRR), discounted payback period (DPP), benefit-cost ratio (BCR) (table10).

Indicators which belong to this group of criteria consider a factor of loss of cost of money over time and are defined on the basis of reduction of cash flows (cost-benefit) generated by the project to the present time or based on discounting.

Considering results, students should make conclusions about feasibility of financing of the proposed project. It is advisable to compare situation "project realization" and "without project" for investor and enterprise, where project is implemented.

It is necessary to indicate investors of the project: country; organization, funding, share in project financing of some investor in percentage from the total project cost.

Table 7. Indicators of projects evaluation

Indicators	Formula	Notes
Net present value (NPV)	$NPV = \sum_{k=1}^n \frac{B_t - C_t}{(1+i)^n} - IC$ <p>where B_t – benefits of the project per year t C_t - project expenses per year t i - discount rate n – project duration</p>	<p>If $NPV > 0$ — accept project; $NPV = 0$ — project will not result in any profit or loss; $NPV < 0$ — project is unprofitable and it should be rejected.</p>
Profitability index (PI)	$PI = \sum_{k=1}^n \frac{B_t - C_t}{(1+i)^n} : IC$	<p>The project is rejected if $PI < 1$; accepted if $PI > 1$; in the case of $PI = 1$, the project is neither profitable nor unprofitable.</p>
Discounted rate of return on investment (DROI)	$DROI = NPV/PV (CF_{inv}) = PI - 1$	<p>$DROI > 0$ - the project is accepted</p>
Internal rate of return (IRR)	$IRR = r, \text{ in which } NPV = f(r) = 0.$ $IRR = A + \frac{a(B - A)}{(a - b)}$ <p>where A — the value of the discount rate at which NPV is positive; B — the value of the discount rate at which NPV is</p>	<p>Enterprise may take any decisions of investment character, if the level of profitability (IRR) is not lower than the current capital cost (CC). If $IRR < CC$, such project is</p>

	negative; a — value of positive NPV, at a value of discount rate of A; b — value of NPV, at a value of discount rate of B.	rejected, if $IRR > CC$, is accepted.
Discount payback period (DPP)	$DPP = \min n,$ in which $\sum_{k=1}^n P_k * \frac{1}{(1+r)^k} \geq IC$	a) project is accepted if there is a payback; б) project is accepted only if the payback period does not exceed the limit set in organization.
Benefit-cost ratio (BCR)	$BCR = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}}$	It is advisable to finance the project with BCR coefficients, which are $>$ or $= 1$.

Developing investment project financing schemes student should consider its five main variants:

1. Full internal self-financing.

Provides funding entirely from domestic sources - "funding without leverage". Such financing is inherent to the first stage of the life cycle of an enterprise or real investment projects.

2. Going public.

It is used for large-scale real investment projects by sector or regional diversification of investment activity on the basis of public subscription for shares of enterprise.

3. Venture financing.

A certain amount of capital to individual enterprises is provided to implement innovative real projects of high risk. In exchange for a respective share in an authorized fund or a certain share block. This method is carried out through an intermediary - Venture Company.

4. Credit financing.

Used for small short-term investment projects with high standard of profitability of investments.

5. Mixed financing.

Involves equity and debt capital.

Enterprise, using only equity, has the highest financial strength, but limits the rate of development and does not use financial opportunities to increase return on invested capital.

Enterprise which uses debt capital has the highest financial potential of development and opportunities to increase financial profitability, but generates more financial risk and the threat of bankruptcy.

Selecting a project financing scheme student must take into account:

- 1) To form investment resources for creation of new company internal sources of financial resources cannot be involved; they are not available on this stage.
- 2) The basis of the formation of start-up capital is equity of its founders.
- 3) Start-up capital is formed when creating a new company and may be involved in any form.
- 4) Equity of company founders is invested in the form of statutory fund.
- 5) Features of formation of statutory fund of the new enterprise are determined by organizational and legal forms of its creation.
- 6) The limited circle and possibilities of borrowing at the stage of enterprise creation.
- 7) High risks related to the formation of capital.

2.5. Project Risk Analysis

The risk of the project does not accept static, absolute value once and for all. It changes its characteristics depending on the stage of the project. Therefore, company management should constantly monitor processes of implementation and management of project to identify weak signals in advance and to prepare a mechanism for effective risk management.

The purpose of the project risks analysis is to evaluate all its types and possible ways to reduce them, feasibility of the project with the current level of risk and ways to reduce it. This analysis involves identifying project risks and their evaluation with definition of powerful factors, search for ways to reduce the risk, taking it into account evaluation of project feasibility and way of its financing.

Identifying risks it is necessary to allocate risks by the scale: is this risk peculiar to a specific innovation project, or to enterprise (for example, risk of lack of financial stability), or is this risk essential for the activity of the industry and market as a whole.

Risk of innovative project never takes zero, because the environment of its realization is never determined and clearly defined.

The most effective forms of insurance are determined in accordance with evaluation of individual risks: - development of measures for their prevention; - creation of appropriate reserve funds; - insurance of the most important risks; - distribution of negative financial consequences among investors and participants. This chapter also covers possible options for leaving the investment project at any stage of its implementation, if the actual level of risk is much

higher than estimated (industry average or regional average), significantly affects the efficiency of the investment process.

Risk measurement scale is used for risk evaluation. There are scale of evaluation of risk probability (three-leveled (Table 8), seven-leveled); scale of evaluation of risk consequences (Table 9).

Table 8. Three-leveled distribution of risk probability

Interval of probability	Value of probability	Verbal formulation	Numerical evaluation
1-33%	17%	Low	1
34-67%	50%	Average	2
68-99%	84%	High	3

Table 9. Scale of risk impact evaluation on four project goals

Project	Probability				
	Very low	Low	Average	High	Very high
Risk of failure to achieve the project objectives	0,05	0,10	0,20	0,40	0,80
Consequences					
Cost	Slight increase in cost	Increase in cost <10%	Increase in cost 10-20%	Increase in cost 20-40%	Increase in cost >40%
Terms	Slight increase in time	Increase in time <5%	Increase in time 5-10%	Increase in time 10-20%	Increase in time >20%
Content	Barely noticeable reduction of the content	Influence on the secondary content area	Impact on the main content area	Reduction of content is inappropriate for sponsor	Final product of the project is almost useless
Quality	Barely noticeable decline in the quality	Influence only on the most demanding application	Sponsor permission is required to lower the quality	Decreasing of quality is inappropriate for sponsor	Final product of the project is almost useless

Indicator "risk importance" is used in taking decision process about control of project risks (risk exposure):

$$VR = A * q,$$

where: VR — risk importance;

A — threat (a consequence, action) of risk (undesirable event);

q — probability of its occurrence.

Risk probability — a measure of probability that consequence (effect) of risk really will take place.

Risk impact — a measure of seriousness of the negative consequences, level of losses or evaluation of potential opportunities connected with risk.

There are situations where for various reasons, mostly due to the lack of reliable information; it is not possible to use statistical calculation and analytical methods. In such cases, methods, using the results of experience and intuition, the heuristic methods or expert evaluation methods, are widely used.

To characterize the risk as a measure of uncertainty use following indicators:

1) dispersion

$$D(x) = \sum_i (x_i - M(x_i))^2 P_i, \text{ where}$$

$$M(x) = \sum_i x_i P_i,$$

where: $M(x)$ – mathematical expectation of integral effect of project;

x_i – integral effect at the i -th scenario;

P_i – probability of this scenario.

2) mean-square deviation

$$\sigma(x) = \sqrt{D(x)};$$

3) coefficient of variation

$$\text{var}(x) = \frac{\sigma(x)}{M(x)}.$$

Mean-square deviation is often used as a measure in projects with the same expected return value. The higher is the value, the greater is the risk. Comparing projects with different expected values of income use coefficient of variation, which shows the proportion of risk per unit of the expected revenue.

It is advisable to draw up a register of risks (Table 10), which includes: identified risks; root causes of risks; lists of possible responses; persons responsible for risk; symptoms and features; relative ranking or list of project risks, sorted by priority; a list of risks that require immediate response; a list of risks that require further analysis and response; trends in results of qualitative analysis; and a list of low-priority risks requiring observation.

Table 10. Register of project risks

Risk area	Risk category (type)	Identification of risk		Owner of risk ("risk manager")	Risk evaluation		Mitigation options	Instance
		Title of risk	Description, impact on project		Impact	Probability		

Practical part is completed by project passport (see Annex E).

5. REQUIREMENTS TO THE DESIGN OF THE COURSE WORK

The amount of course work tasks must meet at least **25 hours** of intensive students self-learning.

Course work must be written in English and given to lecturer printed. Writing of the course work in English, its printing and meeting sample of the title page are university requirements.

General requirements. Text and graph materials of course work are printing via computer on the one paper sheet of A4 format. It is necessary to give stitched course work with hardcover before defense.

Work should be done in accordance with the current standard of design of text documents (DSTU 3008-95. Documentation. Reports in science and technology. The structure and rules of design) on paper sheets in A4 format (210x297 mm).

Main text font: Times New Roman size 14. Page parameters: field at top and bottom - 2 cm, right - 1,5 cm, left - 3 cm; interval - 1.5, paragraph - 1.5 cm.

All pages (except the title page) should be numbered.

It is not obligated to shorten words in text except of generally accepted. It is necessary to provide the transcript of signs in formulas and point units of their measurement.

The total amount of course work must be about 35-40 pages typewritten in format A4 of main text (excluding the list of used information sources and annexes) made in the format of editor Word 2003, 2007, 2010.

The first page of the course work is a title page included to the total page numbering of work without its number (sample of design see in Annex C).

Titles of structural parts of course work "CONTENT", "INTRODUCTION," "CHAPTER", "CONCLUSIONS", "REFERENCES", "ANNEXES" are typed in large letters symmetrically to the text. Titles of units are in small letters (except the first large) with indentation. Do not type the dot at the end of the title. If the title consists of two or more sentences, they are divided by dot.

Each structural part of the course work begins with a new page.

Such structural parts of the course work as content, introduction, conclusions, and references have no sequence number.

Chapters are pointed with Arabic numerals (1, 2, 3, ...) and units - the number of chapter and unit sequence number with a dot (2.1, 2.2, 2.3, ...).

Units are numbered within each chapter. A unit number consists of chapter number and sequence number of the unit with dot between. At the end of unit number shall be a dot, for example: "2.3." (third unit of the second chapter). Then, there is a title of the unit in the same line.

Figures, tables, formulas. Graphs, diagrams and tables should be presented in the course work directly after text where they are mentioned for the first time, or on the next page.

Graphs and charts are indicated with word "Fig." and numbered consecutively within chapter. Title of the figure begins with short word "Fig." and sequence number: Fig.1. Organizational structure of the enterprise. Figure title should be below the figure.

Tables are numbered consecutively within chapter. At the top right corner of the appropriate title of the table place the word "Table" with its number. Table number consists of chapter number and sequence number of table with a dot between, for example "Table 1.2" (second table of the first chapter). Each table must have a title, which is placed over it and typed symmetrically to the text. Title and the word "Table" begin with a capital letter. Refer to figures and tables in the text with abbreviations with numbers – table 1, fig. 2.

Formulas in work (if more than one) are numbered within the chapter. Number of formula consists of chapter number and sequence number of formula in the chapter with a dot between. Numbers are typed at the right corner of the sheet in the same line with appropriate formula enclosed in parenthesis, example (3.1) (first formula of the third chapter).

Numbering. Numbers of pages, chapters, units, figures, tables, formulas are typed with Arabic numerals without № sign. All pages are numbered, except the title page and content. Number of pages is pointed in the top right corner of the page without a dot.

References. List of references is provided at the end of the course work by alphabet. This list reflects the independent creative work of the author and demonstrates the degree of fundamentality of the study.

Bibliographic description is made directly by book or from catalogs and bibliographic indexes completely with including all elements, abbreviations etc.

All sources are numbered with Arabic numerals. A source with reference in text is indicated with sequence number of position in the list of references (for example - [5, p.22] - means that information is used from source at number 5 in the list of references, which is on page 22). Information about the sources in the

list should be given in accordance with the requirements of national standard with obligatory pointing of works.

Annexes. The annexes contain support material that complements the text of the course work, but large in size, have special ways of performance or if its inclusion to the main part can change an ordered and logical understanding of the work. Annexes are formed as an extension to the course work on the next pages, placing them in sequence of references in the text. Each begins with a new page. Annex must have a title, typed above in small letters with the first capital symmetrically to the text of page. Word "Annex" is typed right above the title in small letters with first one capital with capital letter of the English alphabet indicating its sequence.

If there is one annex in the work, it is pointed as Annex A.

Course work as original theoretical and applied research should have some logic construction, consistency and completeness.

Course work consists of the following parts:

- title page (performed only in English, form is given in annex);
- task for course work (the original data to the theoretical and practical parts of work);
- summary (abstract) (performed in English or foreign language); point laconically: content of work, justification and calculations, amount of work, number of figures, tables, references. Summary is done in accordance with DSTU 3008-95 on a separate standard sheet;
- content (performed according to DSTU 3008-95 on a separate standard sheet). It may take 1-2 pages. Titles of all chapters and units (paragraphs) with pointing of start pages are indicated in it. Content of the course work should reflect the nature of the problem, its complexity and logic of research. Titles of chapters and units should be brief and understandable, literary literate, closely associated with theme of the course work, but do not repeat it.
- introduction (one page): formulate value of theme, briefly describe the object of study, noting the purpose or objectives of the course of work;
- theoretical part: it is necessary to completely disclose the content of the proposed theme and complete with material that was not covered in class;
- practical part;
- conclusions (separate one page): give specific results obtained in the appropriate chapters of the course work, pointing calculated indicators;
- references: (contains compiled according to existing rules list of used literature sources and websites), submit all literature sources used in the course work, each source shall be executed according to all the characteristics necessary for its search, at each position of reference list must be a reference in the course work.

- annexes (there are tables of auxiliary character, charts, graphs, examples of computer screens, printed reports with results of computer modeling).

6. DEFENSE AND ESTIMATION OF THE COURSE WORK

Defense of course work is provided to check the student's knowledge and evaluate its correctness. Defending student should be able to justify his own calculations and show a deep understanding of written course work.

Lecturer monitors student course work performance during consultations and final control - during its defense. Date of defense is set by department with lecturer agreement. Student should defense the course work before exam session.

Course work should be given to lecturer for checking no later than 2 weeks before the date of defense.

Student prepares illustrations for defense (tables, graphs, charts, figures) for all commission members.

Defense of student course work takes place publicly according to schedule. Commission provides pre-specified time on the report and answering on the questions, which is, on average, fifteen minutes to each student.

Time of report should not exceed seven minutes; report should be brief, specific, with using illustrations, posters, handouts (set of tables, graphs, charts, diagrams or relevant slides). The main purpose of these applications - in detail and clearly illustrate certain statements of the author, so it is necessary to refer to the appropriate material in time, to focus on it the attention of the commission.

Student is allowed to make a presentation of course work using presentation software such as PowerPoint or otherwise, with a demonstration on the big screen. This presentation should have 12-14 slides.

During defense student should briefly summarize the results of calculations and conclusions, answer on the question of lecturer.

The final module-rating estimation received by the student on results of defense of course work in scale ECTS and traditional national scale is entered into exam note of student academic records (table. 6.1).

Number of important indicators of the quality of the course work is taken into account in the process of estimating:

1. Substantive aspects of the course work:

- actuality of the chosen theme of research;
- work focus on the development of real practical recommendations;
- compliance of logical construction of the course work with set goals and objectives;

- width and adequacy of methodological and diagnostic system;
- availability of alternative approaches to solving identified problems;
- professional level of justification and presentation of proposed solutions;
- degree of independence of the research;
- sophistication of language of course work and its overall design.

2. Quality of defense of course work:

- ability to briefly, consistently and clearly state the nature and results of research;
- ability to reasonably defend own suggestions, thoughts, views;
- overall level of student preparation.

Rating evaluation of the course work will have two components. The first (starting) characterizes the work of students and its result - the quality of explanatory report and graphics. The second part describes the quality of student defense of the course project.

The size of the scale of the first component is 40 points, and the second component - 60 points.

The system of rating points

1. Starting component (r_1):

- timeliness of schedule implementation - 5-3 points;
- modernity and justification of taken decisions - 12-7 points;
- correctness of application of analysis methods and calculation – 10-6 points;
- quality of design, compliance with requirements of normative documents - 6-4 points;
- quality of graphic material and compliance with DSTU - 7-4 points.

2. Component of defense of the course work (r_2):

- degree of knowing material – 10-6 points;
- completeness of analysis of possible variants –15-9 points;
- degree of justification of taken decisions - 20-12 points;
- ability to defend own views – 9-15 points.

Total score of two components is transferred to the record-assessment in accordance with Table 7:

Table 7. Criteria for assessment of the course work

Points $R = r_1 + r_2$	ECTS Assessment	National Assessment
95-100	A	perfectly
85-94	B	good
75-84	C	
65-74	D	satisfactorily
60-64	E	
Less than 60	Fx	unsatisfactorily
Course work is not allowed to defend	F	not passed

After discussion of results of defense commission submitted its decision at a closed meeting. In case of disagreement between the members of the commission chairman opinion is crucial. Chairman announces decision of commission on the same day.

Student who did not submit a course work for defense in the schedule time, or did not defend it with a positive assessment, is considered as having academic debt.

7. EDUCATIONAL AND METHODOLOGICAL MATERIALS

Main references

1. Heagney, Joseph. Fundamentals of project management / Joseph Heagney.— 4th ed. 2012. – 223 p.- ISBN-13: 978-0-8144-1748-5, ISBN-10: 0-8144-1748-5
2. Russell W. Darnall John M. Preston Beginning Project Management // <http://2012books.lardbucket.org/>
3. Hill, Gerard M. The complete project management office handbook / Gerard M. Hill. -- 2nd ed.2008.- 690 p.
4. Єрфорт І.Ю. Управління проектами: метод. посіб. / І.Ю.Єрфорт, О.Ю. Єрфорт / Донбаська держ. машинобудівна академія. — Краматорськ : ДДМА, 2009. — 184с.
5. Збаразська Л.О. Управління проектами: навч. посібник для студ. вищих навч. закл. / Збаразська Л.О., Рижиков В.С., Єрфорт І.Ю., Єрфорт О.Ю. — К. : Центр учбової літератури, 2008. — 168с.
6. Ноздріна Л.В. Управління проектами: підручник / Ноздріна Л.В., Ящук В.І., Полотай О.І./ За заг.ред.Л.В.Ноздріної. – К.: Центр учбової літератури, 2010. – 432с.
7. Програми нормативних навчальних дисциплін підготовки спеціаліста і магістра галузі знань 0306 «Менеджмент і адміністрування»/ Упорядн. А.А.Мазаракі, Т.І. Ткаченко, Н.М. Гуляєва та ін. – К.: Київський національний торговельно-економічний університет, 2011. – 310с.
8. Рач В. А. Управління проектами: практичні аспекти реалізації стратегій регіонального розвитку: навч. посіб. / В. А. Рач, О. В. Россошанська, О. М. Медведєва; за ред. В. А. Рача. – К.: «К. І. С. », 2010. – 276 с

Additional references

1. Азаров Н.Я. Инновационные механизмы управления программами развития / Азаров Н.Я., Ярошенко Ф.А., Бушуев С.Д. - "Саммит-Книга", 2011. - 528 с.: ил. ISBN 978-966-7889-69-2
2. Богданов В.В. Управление проектами в Microsoft Project 2007: Учебный курс: автоматизированный менеджмент проектов / Богданов В.В. — СПб. ; М.; Нижний Новгород; Воронеж; Ростов н/Д.: ПИТЕР, 2008. — 592с.
3. Бушуев С.Д. Креативные технологии управления проектами и программами: Монография / Бушуев С.Д., Бушуева Н.С., Бабаев И.А., Яковенко В.Б., Гриша Е.В., Дзюба С.В., Войтенко А.С. – К.: «Саммит-Книга», 2010. – 768 с.: ил.
4. Бушуев С.Д. Управління проектами розробки інтегрованих інформаційних технологій: навч. посіб. для студ. спец. 8.000003 "Управління проектами" / С.Д.Бушуев, О.С. Войтенко / Київський національний ун-т будівництва і архітектури. — К. : [КНУБА], 2008. — 83с.
5. Верзух Эрик. Управление проектами: ускоренный курс по программе MBA / Верзух Эрик. - Диалектика, 2009. – 480с.
6. Деренська Я.М. Управління проектами у схемах: навч. посібник для студ. вищих навч. закл. / Деренська Я.М. / Національний фармацевтичний ун-т. — Х. : Видавництво НФаУ, 2009. — 224с.
7. Лич Л. Вовремя и в рамках бюджета: Управление проектами по методу критической цепи / Лоуренс Лич; Пер. с англ. – М.: Альпина Паблишерз, 2010. – 354с.
8. Милошевич Драган З. Набор инструментов для управления проектами /Драган З. Милошевич; Пер. с англ.Мамонтова Е.В.; под. ред.Неизвестного С.И. – М.: Компания АйТи; ДМК Пресс , 2008. – 729с.
9. Нагоев А.Б. Пособие по управлению проектом /Нагоев А.Б. – Нальчик: Каб.-Балк. ун-т, 2004. – 117 с.
- 10.Национальная ассоциация управления проектами "СОВНЕТ" [Электронный ресурс]. – Режим доступа: <http://www.sovnet.ru/>
- 11.Новиков Д.А. Управление проектами: организационные механизмы / Новиков Д.А. – М.: ПМСОФТ, 2007. – 140 с.
- 12.Ньютон Р. Управление проектами от А до Я / Ричард Ньютон; Пер. с англ – М.: Альпинина Бизнес Букс, 2007. – 180с.
- 13.Петрова Н.Б. Інноваційний менеджмент у прикладах і завданнях: навч.посібник / Петрова Н.Б., Мущинська Н.Ю., Чеканова Л.Г. – Х.: ХНАМГ, 2009. – 248с.
- 14.Руководство к своду знаний по управлению проектами, 4-е издание/ Project Management Institute (PMI). – Project Management Institute, Inc., 2008. – 496 с.
- 15.Стовер Т. С.Microsoft Office Project 2007. Inside Out. Полное руководство / Стовер Т. С. – 2008. – 976с.
- 16.Украинская ассоциация управления проектами УКРНЕТ [Электронный ресурс]. – Режим доступа:<http://upma.kiev.ua/content/view/40/78/lang/ru/>

17. Управление проектами. Основы профессиональных знаний и система оценки компетенции проектных менеджеров (National Competence Baseline, NCB UA Version 3.1) : / Бушуев С.Д., Бушуева Н.С. - Изд. 2-е. - К.:ІРІДІУМ, 2010. – 208 с.
18. Управление проектами: Harvard Business Review on Project Management. – Альпина Бизнес Букс, 2007. – 192с.
19. Четфилд К. Microsoft Office Project 2007. Шаг за шагом / Четфилд К., Джонсон Т. – 2007. – 640 с.
20. Clifford F. Gray. Project management. The managerial process / Clifford F. Gray, Erik W. Larson. — McGraw-Hill/Irwin, 2008. – 589 p.
21. David Hillson. Practical Project Risk Management: The Atom Methodology / David Hillson, Peter Simon. – Management concept, 2007. – 247p.
22. Jack Gido. Successful Project Management / Jack Gido, James P. Clements. The fourth edition, 2008. – 480 p.
23. Jason Charvat. Project management methodologies: Selecting, Implementing, and Supporting Methodologies and Processes for Projects / Jason Charvat, 2003. – 239 p.
24. Microsoft Project.ru [Электронный ресурс]. – Режим доступа: <http://www.microsoftproject.ru/news.phtml>
25. Robert K. Wysocki. Effective Project Management: Traditional, Agile, Extreme / Robert K. Wysocki. – Wiley Publishing, 2011. – 792p.

ANNEXES

Annex A

LIST OF THE COURSE WORK THEMES

Themes of the course works:

1. Project management in system of management of organizations
2. Project integration management
3. Justification of the project feasibility
4. Project organizational support
5. Management of project content
6. Project terms management
7. Project cost management
8. Control of the project realization
9. Project quality management
10. Human resources management
11. Project communications management
12. Project risk management
13. Project supply management
14. Project implementation management
15. Project completion management
16. Management of programs and project portfolio
17. Project financing
18. Corporate project management system
19. Management of information support of the project
20. Fundraising and designing

Annex B

Approved _____
(Signature and name of lecturer)

Task is accepted
(Signature and name of student)

CALENDAR PLAN OF THE COURSE WORK

#	Stages of the course work	Deadlines of work stages	Notes
1	Approval of the theme of course work and investigated enterprise		
2	Search and study of relevant literature and practical material		
3	Plan of course work		
4	Making the theoretical part of course work		
5	Research, analysis of received information after research, calculations		
6	Making the practical part of course work		
7	Defence of course work		

**NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
«KYIV POLITECHNIC INSTITUTE»**

Management and Marketing department
Management department

COURSE WORK

on _____ *Project management* _____
(discipline)

on theme: «*Project management in the system of organization management*»

Student of V year of _____ group
of study «*Management*»
of specialty _____
_____ (name)

Lecturer _____
(position, rank, scientific degree, name)

National scale _____
Number of points: _____ Score: ECTS _____

Commission
members

_____	_____
(signature)	(name)
_____	_____
(signature)	(name)
_____	_____
(signature)	(name)

Kyiv - 2017

VALUE OF LAPLACE FOR NORMAL PROBABILITY DISTRIBUTION

X	$F(X)$	X	$F(X)$	X	$F(X)$	X	$F(X)$
-3,0	0,0013	-1,5	0,0668	0,1	0,5398	1,6	0,9452
-2,9	0,0019	-1,4	0,0808	0,2	0,5793	1,7	0,9554
-2,8	0,0026	-1,3	0,0968	0,3	0,6179	1,8	0,9641
-2,7	0,0035	-1,2	0,1151	0,4	0,6554	1,9	0,9713
-2,6	0,0047	-1,1	0,1357	0,5	0,6915	2,0	0,9772
-2,5	0,0062	-1,0	0,1587	0,6	0,7257	2,1	0,9821
-2,4	0,0082	-0,9	0,1841	0,7	0,758	2,2	0,9861
-2,3	0,0107	-0,8	0,2119	0,8	0,7881	2,3	0,9893
-2,2	0,0139	-0,7	0,2420	0,9	0,8159	2,4	0,9918
-2,1	0,0179	-0,6	0,2743	1,0	0,8413	2,5	0,9938
-2,0	0,0228	-0,5	0,3085	1,1	0,8643	2,6	0,9953
-1,9	0,0287	-0,4	0,3116	1,2	0,8849	2,7	0,9965
-1,8	0,0359	-0,3	0,3821	1,3	0,9032	2,8	0,9974
-1,7	0,0446	-0,2	0,4207	1,4	0,9192	2,9	0,9981
-1,6	0,0548	-0,1	0,4602	1,5	0,9332	3,0	0,9987
		0,0	0,5000				

PROJECT PASSPORT**1. Project Information**

Name of project _____
 Aim of the project _____
 Main competitive advantages of the project _____

2. Products

Name of products (services, works) _____
 Purpose and main characteristics _____
 Characteristics of novelty (radically new products, modernization of the known structure, new design, analogue of foreign products, analog of output, other) _____

Necessity of protection (indicate yes or no)

- patent protection _____
 - licensing of products _____
 - licensing of activity _____
 - product certification _____

3. Marketing research

Characteristics of the internal market:
 volume of demand _____ units.
 planned volume of products sales (fulfilled services, works) _____ units.
 expected market share _____ %
 main consumers _____
 characteristics of distribution channels _____
 characteristics of the main competitors _____
 advantages above competitors _____

4. Financial and economic project parameters

Total demand for investment _____ units.
 by resources:
 own funds _____ units.
 bank loans _____ units.
 direct investment _____ units.
 state funds _____ units.
 other sources _____ units.
 dynamic payback period _____ years
 net present value _____ units.
 internal rate of return _____ %
 index return _____

5. Offers to investor

Possible participation of investor:
 investment property _____
 intangible investments _____
 financial resources _____

Date of the Project _____