CHAPTER LEARNING OBJECTIVES:
MAJOR:
- Make calculations using and understand fully the time value of money (TVM) concepts – Appendix 14A and 14C.
- Calculate the net present value (NPV).
- Calculate the internal rate of return (IRR) assuming a single annuity situation only, including interpolation of the TVM tables to the nearest tenth of a percent.
- Rank investments using NPV or IRR.
- Calculate the pay back.
- Calculate the simple rate of return.
MINOR:
- Identify the limiting assumptions of NPV and IRR.
NOT IMPORTANT:
- Learning present and future value formulas.
- Inflation and capital budgeting – Appendix B.
- Income taxes in capital budgeting decisions will not be covered – Appendix 14D, solely because of time constraints. This topic should be studied on your own!

The **Time Value of Money (TVM)** concept assumes that a nominal amount of money (a given amount such as $1,000) is worth more today than the same amount at a later date because of the ability to invest that money and make it grow to a larger sum later. Therefore, the reverse is also true. A given amount later is worth less that the same amount today.

Therefore, calculating the Future value is accomplished by adding the earned interest to the starting amount (principal) to arrive at the answer. Or, calculating the Present Value is accomplished by subtracting the interest from the principal to arrive at the answer.

**Netting** means adding cash inflows and subtracting cash outflows.

**Discount** rate and interest rate are the same things. The term “interest” rate is used in those situations where you are calculating the future value. The term “discount” rate is used in those situations where you are calculating the present value. In Capital Budgeting Decisions the focus is on present values, therefore, the term discounting is used.

**Net Present Value** is determined by netting the outflows of the present with present values of the future cash inflows and outflows. If the net difference is positive it means the project is likely to earn more than the discount rate used. If the net difference is Zero (-0-) it means the project is likely to earn exactly the discount rate used. If the net difference is negative it means the project is likely to earn less that the discount rate used. Any project that earns the discount rate used, or more, is a good project; and any project that will not earn the discount rate used is not a good project.
Internal Rate of Return (aka: time adjusted rate of return) is determined by finding the discount rate that will be earned by the proposed project. Mathematically it means to find the discount rate that needs to be used to make the net present value equal to zero (-0-). Then a comparison with the cost of capital would determine if the project is acceptable or not.

Screening methods determine which proposed projects are acceptable or unacceptable, but cannot determine which acceptable project is best.

Preference methods determine which projects are best, second best, etc. from those acceptable projects. If all proposed projects have the same cost and the same life, then the one with the highest IRR or highest NPV would be the best amongst those that meet, or exceed, the minimum requirements. For those projects with different initial costs or different lives, then the following would determine which is best.

When using the:
- **Internal Rate of Return**: The IRR that is highest amongst the acceptable projects is the best. The second highest is second best, etc.
- **Net Present Value**: A profitability index must be calculated for each of the acceptable NPV projects. The one that has the highest index number is best; the one with the second highest number is second best, etc.

\[
\text{Profitability Index} = \frac{\text{present value of cash flows}}{\text{Net investment required}}
\]

- When using both approaches (i.e., the IRR and NPV) and the results differ at to which is the best investment, the general consensus seems to favor using the NPV approach and the profitability index. The reason for using the NPV over the IRR is tied to the basic limiting assumptions. Recall, each method assumes cash inflows in the early years are reinvested at the same, or higher, rate of return used in the calculations. It is more realistic to assume a reinvestment rate equal to the cost of capital rather than more than the cost of capital. A proposed investment that has an IRR greater than the cost of capital would assume a reinvestment rate equal to the IRR, whereas, the NPV approach would assume a reinvestment rate equal to the cost of capital.

Payback is determined by finding the time (in months or years) it will take to return your invested money. Your allowed payback time is predetermined for all projects, and as such, it makes the payback method a screening tool. It can be determined if the proposed project is not acceptable but cannot determine if the proposed project is acceptable under any other criteria. This approach is inferior because it does not consider the time value of money.

Simple Rate of Return is also known as the Accounting Rate of Return. This approach uses the net income from an income statement divided by the net cost of the proposed investment to arrive at a rate of return. This approach is inferior because it does not consider the time value of money.

Post audit of investment projects means to compare the actual results with the projected outcome. The third thing that management does, from chapter one, is control. This means compare actual results and budgeted amounts. The last step in the scientific approach to decision making, like the manager’s control function, is to review your decision making approach after you have determined the actual outcome. This will improve your decision-making abilities in the future. Of all the steps in the scientific approach to decision making, this seems to be the least followed. It is, in the long run, the most important.

_Don’t be afraid to admit to errors, learn and grow from them. Anyone who cannot is doomed to failure._